

ENTREPRENEURSHIP, INDUSTRIALIZATION, AND
METROPOLITAN FORMATION IN SÃO PAULO, BRAZIL:
HISTORICAL ROOTS (1880-1930) AND RECENT DEVELOPMENTS
(2000-2005)

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The utmost goal of this dissertation is to explore the entrepreneurial movements that have paved the way for the industrialization of São Paulo. The persistence of manufacturing sectors as anchors of socio-economic development in the metropolitan region of São Paulo (MRSP) is historically rooted in the emergence of coffee as the main export product in the state of São Paulo on the eve of the twentieth century. On the one hand, the industrial tradition of the MRSP was engendered by the infusion of an entrepreneurial mentality into the economy by the most prominent coffee planters of Western São Paulo. The genesis of Brazilian industrialization is a consequence of the capitalist orientation of coffee planters in Western São Paulo who sought to expand their sources of income by investing the surpluses of the coffee economy in other sectors of the economy, including manufacturing. The thriving coffee economy in São Paulo provided economic agents with entrepreneurial opportunities outside the export-led sector of the economy. On the other hand, the new combinations in the economic circuit which are conducive to economic development are partially organized in the political sphere. The roots of metropolitan formation in the state of São Paulo came into light as a consequence of a

politicized capitalism in Brazil; in other words, the protection of the income of the export-led sector in the policy arena guaranteed the capital surpluses for investments in manufacturing, thereby creating seminal economies of agglomeration around the city of São Paulo. Furthermore, one of the core ideas pervading this dissertation is that entrepreneurship has a spatial dimension as economic actors expand the scope of capitalist accumulation by recombining the geographical architectures of the economy. In light of the historical roots of industrialization - enmeshed in entrepreneurship in its economic, political and spatial dimensions - the MRSP is nowadays strongly oriented to manufacturing production. The empirical evidence in this dissertation will reveal that the patterns of industrial location in São Paulo have been far from showing an inevitable decadence of manufacturing in the MRSP, which accounts for a substantial share of manufacturing production in the state.

BIOGRAPHICAL SKETCH

Rogério dos Santos Acca (São Paulo, Brazil, September 24th 1976) went to the University of São Paulo (USP) from 1998 to 2004. He holds a Master's degree in Sociology and a Bachelor's degree in Social Sciences from the same university. In 2000, he received a scholarship from the United Nations to participate in the prestigious International Course on Local and Regional Development Policies at the Latin American Institute for Economic and Social Planning (ILPES), which is part of the United Nations Economic Commission for Latin American and the Caribbean (UN-ECLAC), in Santiago, Chile. His scientific initiation research at the University of São Paulo was published in 2001 after analysis of merit conducted by the Faculty of Philosophy, Languages and Social Sciences (FFLCH-USP), which selected the best student papers for publication. He was awarded honors mention in the IV Brazilian Prize for Policy and Urban Planning offered by the National Association of Graduate Programs in Urban Planning (ANPUR) in 2005 for one of the best master's thesis in urban planning produced in Brazil in the biennium 2003-2004. In 2007, after a very competitive selection process, he was one of the few researchers in Latin America selected to conduct research for the Getulio Vargas Foundation Law School (EDES-FGV) and the Inter-American Development Bank (IDB) under the auspices of the Latin American Case Study Library on Law and Public Policies (CASOTECA). He is one of the youngest authors in the history of *Dados*, the most prestigious social science journal in Brazil. He lives in São Paulo, and loves his family, Corinthians (his soccer team), cooking and pizza.

A meus pais

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LIST OF ABBREVIATIONS

- II PND – The Second National Development Plan, Brazil
- ANPUR – National Association of Graduate Programs in Urban Planning
- BERD – Business Enterprise Intramural Expenditure on R&D
- CAPES – Coordination for the Improvement of Higher Level Personnel
- CASOTECA – Latin American Case Study Library on Law and Public Policies
- CBO – Brazilian Classification of Occupations (Classificação Brasileira de Ocupações)
- CNAE – National Classification of Economic Activities (Classificação Nacional de Atividades Econômicas)
- DCTA – Department of Aerospace Science and Technology (DCTA)
- EDESP – Getulio Vargas Foundation Law School
- EMBRAER – The Brazilian National Aviation Company (Empresa Brasileira de Aviação)
- FAPESP – São Paulo Research Foundation (Fundação de Amparo à Pesquisa do Estado de São Paulo)
- FFLCH – Faculty of Philosophy, Languages and Social Sciences at the University of São Paulo
- FIBGE – The Brazilian Foundation-Institute of Geography and Statistics (Fundação Instituto Brasileiro de Geografia e Estatística)
- FDI – Foreign Direct Investment
- FGV – Getulio Vargas Foundation
- GCBA – Government of the City of Buenos Aires
- GIS – Geographical Information Systems
- GDP – Gross Domestic Product

GERD – Gross Domestic Expenditure on R&D

GRDP – Gross Regional Domestic Product

IBGE – The Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatística)

IDB – Inter American Development Bank

ILPES – Latin American Institute for Planning and Development

IMF – International Monetary Fund

IMP – Information on Cities in São Paulo (Informações dos Municípios Paulistas)

INEGI - The National Institute of Statistic and Geography, Mexico (Instituto Nacional de Estadística y Geografía)

INSEE – National Institute of Statistics and Economic Studies, France (L'Institut national de la statistique et des études économiques)

IPEA – Institute for Applied Economic Research (Instituto de Pesquisa Econômica Aplicada)

ISIC – International Standard Industrial Classification of All Economic Activities

ITA – Technological Institute of the Brazilian Air Force

MRSP – Metropolitan Region of São Paulo

MTE – Ministry of Labor and Employment (Ministério do Trabalho e Emprego)

OECD – Organization for Economic Co-Operation and Development

PIA – Annual Industrial Survey (Pesquisa Industrial Anual)

PINTEC – Survey on Technological Innovation (Pesquisa de Inovação Tecnológica)

PRP – The Republican Party of São Paulo (Partido Republicano Paulista)

RAIS – Annual Survey on Workers (Relação Anual de Informações Sociais)

R&D – Research and Development

SEADE – SEADE Foundation, São Paulo

UF – Federative Units, Brazil

UN – United Nations

UNCTAD – United Nations Conference for Trade and Development

UNICAMP – State University of Campinas

UNSTATS – United Nations Statistical Division

USP – University of São Paulo

UTM – Universal Transverse Mercator

VA – Value Added

VAF – Fiscal Value Added

VTI – Value of Industrial Transformation

PREFACE

The main goal of this dissertation is to unveil the historical movements that have conducted to modern manufacturing development in the state of São Paulo. Closer attention will be paid to the Metropolitan Region of São Paulo (MRSP) and its outskirts. First and foremost, I will explore the entrepreneurial vicissitudes that engendered an urban-industrial agglomeration around the city of São Paulo. In doing so, I will delve into a singular trace of entrepreneurship in Brazil: the entrepreneurial function, i.e. the act of boosting new transformations in the economic sphere come into being as a consequence of privileged political ties – the privileged political ties of coffee planters in São Paulo, who captured the state in order to advance their own interests in the economic field, were one of the main elements in the dynamics of capital accumulation that paved the way for the industrialization of São Paulo. As I will show over the course of this dissertation, the genesis of the industrialization of São Paulo is intrinsically related to the transfer of the surpluses generated in the coffee economy to new economic activities which carved out the landscape of capitalism in São Paulo – e.g. railroads, manufacturing, and commercial as well as financial activities not only oriented to the export-led sector of the economy but also engendered to cater for the nascent internal market. The politicized capitalism in São Paulo opened up avenues for the geographical expansion of capitalist accumulation in the state of São Paulo, thereby creating synergies between the new coffee estates in the thriving Western regions of the state and the newborn urban center, the city of São Paulo – the latter being transformed into a center of command and control of capitalism in the state of São Paulo. Because the city was the vital node of articulation of the

main railroads in São Paulo, primordially oriented to the transport of coffee to the port of Santos, it soon became a source of economic opportunities for immigrants seeking for more decent life conditions in the American continent. Consequently, the city basically attracted masses of European immigrants who fostered new economic activities in São Paulo, among which manufacturing can surely be highlighted. The immigration policy enacted by the state of São Paulo – which heavily subsidized European immigration in the dawn of the twentieth century - also contributed to an entrepreneurial infusion into the capitalist circuit of the city.

I will argue that these historical roots of metropolitan formation cannot be ignored in the analysis of the recent patterns of economic development in the state of São Paulo.

One of the core arguments pervading this dissertation is that these historical roots of industrialization and metropolitan formation cannot be ignored in the analysis of recent patterns of socio-economic development in the MRSP. In so far as the city of São Paulo was the epicenter of industrialization in Brazil, it subsequently concentrated important investments in infrastructure made by the state, which helped to historically engender an unrivalled urban-industrial agglomeration in the Brazilian economic space.

As a consequence, manufacturing production is one of the main motors of economic development in the city of São Paulo and its hinterlands. The empirical results of this dissertation unequivocally reveal that manufacturing activities lie at the core of the socio-economic arrangement of the expanded metropolitan area – which comprises the city of São Paulo and its hinterlands within a radius of 150 kilometers from the city. Not only is this expanded metropolitan territory the most important industrial center in

Brazil, but it is also the most prominent territorial agglomeration for high-tech manufacturing firms. Not coincidentally, estimated Research and Development (R&D) investments made by manufacturing firms in the state of São Paulo are concentrated in the city of São Paulo and its outskirts. The RMSP is, therefore, a center for technological innovation in the manufacturing sector in Brazil. In this sense, the empirical results of this dissertation invalidate the acclaimed and generally accepted post-industrial arguments on the recent socio-economic trajectories of the metropolis. There has not been a functional transition from manufacturing to services as anchors of economic development in the metropolitan region. On the one hand, the decline of manufacturing activities in the metropolitan region is more intense in low-tech manufacturing sectors – the city and its immediate outskirts have specialized in knowledge-intensive manufacturing activities. On the other hand, the movements of deconcentration of manufacturing production in the state of São Paulo have taken place within a radius of 150 kilometers from the city of São Paulo. This shows an expansion of the productive structure of the city of São Paulo towards cities and regions in the immediate productive orbit of the city rather than a transition of the city and its hinterland towards a post-industrial era.

This dissertation is organized in three chapters. In the first chapter, I will compare the perspectives on entrepreneurship in the main writings of Fernando Henrique Cardoso and Joseph A. Schumpeter. The main purpose of this comparison is to explore the entrepreneurial function – i.e. the pushing through of new combinations in the economy – not only as an economic endeavor, as argued by Schumpeter, but also as a political endeavor, following Cardoso's main argument. This first chapter sets the

stage for the second chapter, which is a historical reconstruction of the roots of industrialization in São Paulo. As I will argue, the early industrialization of São Paulo, in the dawn of the twentieth century, came to the fore as a consequence of a political kind of economic entrepreneurship: the coffee planters of São Paulo engaged in politics in order to capture the policy mechanisms of the state to defend the interests of the export-led sector. By capturing the state, the most prominent coffee planters of São Paulo, seeking to expand the scope of capitalism in the state, organized the investments that paved the way for the surge of manufacturing production in São Paulo. Not only were the entrepreneurial endeavors of coffee planters related to investments in manufacturing in the wake of surpluses generated by the booming coffee economy; they also created the socio-economic opportunities for subsequent investments made in manufacturing by economic agents outside the coffee economy – e.g. European immigrants who came to Brazil in search of a more promising socio-economic fate. Finally, in the third chapter, I will deal with the core of my hypothesis: the metropolitan region of São Paulo and its outskirts are strongly oriented to manufacturing production today - even more so when it comes to the geographical patterns of location of knowledge-intensive industrial sectors. The main objective of this chapter is to critically explore the theoretical arguments embedded in the global-city approach to the MRSP. As I will argue, the core idea of the global-city approach – i.e. cities and metropolitan regions across the globe are primordially anchored by financial and business services – cannot be fully applied to describe the patterns of metropolitan formation in São Paulo. The empirical analysis in the third chapter will reveal that there has not been a transition from manufacturing to services as

motors of development in the metropolis – such a transition is predicted by the global city literature; moreover, the city of São Paulo and its outskirts have emerged as platforms of Research and Development (R&D) in the manufacturing sector. As I will demonstrate empirically in the third chapter, there has been a movement of specialization of the metropolitan region in manufacturing sectors that are more dependent on knowledge inputs rather than a movement of deindustrialization marked by a structural decline of manufacturing as a source of new jobs, new economic knowledge as well as economic growth and socio-economic development.

CHAPTER 1

ECONOMIC ENTREPRENEURSHIP AS POLITICS: AN “UNSPOKEN” DIALOG BETWEEN JOSEPH A. SCHUMPETER AND FERNANDO HENRIQUE CARDOSO

Introduction

The aim of this paper is two-pronged. First and foremost, I will sift through Fernando Henrique Cardoso’s approach to entrepreneurship in order to bring into light an analytical perspective that takes into account actors and social contexts commonly ignored by entrepreneurial studies and by the sociology of entrepreneurship. Based on Cardoso’s main works on entrepreneurship and development (Cardoso, 1969; Cardoso, 1972; see also Fernandes, Cardoso, & Ianni, 1976), I will contend that entrepreneurial studies - including the sociology of entrepreneurship - do not take into account the role of entrepreneurs as political actors neither do they analytically portray the relationship between economic entrepreneurs and other spheres of social life, such as the state and the political arena (cf. Ruef & Lounsbury, 2007; cf. Granovetter, 2005; cf. Aldrich, 2005; cf. Gregoire, Noel, Dery, & Bechard, 2006).

Drawing on a critical analysis of Schumpeter (1934; 1942) and Cardoso (1969; 1972), I will aver that the entrepreneurial function might be performed by economic actors who seek to consolidate their market position and their levels of capital accumulation by participating actively in the political arena so that political institutions (e.g. the state and its bureaucracy apparatuses) can be associated to the economic interests of particular social groups (Cardoso,

1972)¹. As the reader will see over the course of this paper, Cardoso explored entrepreneurship in more depth in his book entitled *Industrial Businessman and Economic Development in Brazil* [Empresário Industrial e Desenvolvimento Econômico no Brasil] originally published in 1964 (see Cardoso, 1972). The idea of economic entrepreneurs as political actors had appeared before in a research project led by Florestan Fernandes and entitled *The Industrial Enterprise in São Paulo* [A Empresa Industrial em São Paulo], but it was Cardoso who fully developed the idea that movements of economic change emerge as a consequence of transformations in extra-economic fields of society, mainly politics (see Cardoso, 1972; Fernandes, Cardoso, & Ianni, 1976).

Second, dialoguing with the classic Brazilian sociological literature that dealt with the socio-economic formation of the industrial elites in the metropolitan area of São Paulo (e.g. Cardoso, 1965; Cardoso, 1969; Cardoso, 1972; Fernandes, 1968; Fernandes, 1976), I will pursue a theoretical perspective that connects the socio-economic history of the state of São Paulo, in general, and

¹ Although the concept of *economic entrepreneurship as politics* might overlap with the concept of *political entrepreneurship* drawn by political scientists (e.g. Schneider & Teske, 1992; Sheingate, 2003; Holcombe, 2002), it is imperative to say both concepts are contrasting because they cover distinct social interests in the political sphere. In the field of political theory, the idea of political entrepreneurship stems from two major theorists of entrepreneurship: Israel Kirzner and Joseph Schumpeter. On the one hand, political entrepreneurship, following the ideas of Israel Kirzner, might refer to an individual who exploits an opportunity for profit in the political arena (Holcombe, 2002; Kirzner, 1999). As Holcombe (2002) points out, a profit opportunity does not necessarily emerge from a disruptive and creative force in politics leading to a more efficient distribution of resources. Accordingly, Holcombe (2002, p. 153) avers that politicians generally make a profit (e.g. political support) through predatory profit opportunities – i.e. by transferring resources from the whole society to the groups that give support to his or her agenda. On the other hand, the ideas of Schumpeter on entrepreneurship have had an impact on the concept of political entrepreneurship. For instance, Sheingate (2003, p. 185) defines political entrepreneurs “as individuals whose acts have transformative effects on politics, policies, or institutions”. Moreover, Schneider & Teske (1992, p. 742) argue that political entrepreneurs usually engage in political coalitions oriented to challenging the *status quo* so that they can carry out new policies that are more beneficial to citizens – i.e. policies that allocate resources more efficiently. Despite the fact economic entrepreneurship as politics might involve transformations in the political field, the main motivation behind the political engagement of economic entrepreneurs in the political arena is to make profits in the economy. In other words, economic entrepreneurship as politics comes into light when economic innovations depend on the mobilization of political resources (e.g. Fernandes, Cardoso, & Ianni, 1976; Martins, 1967; Cardoso, 1972).

the history of the metropolitan region of São Paulo, in particular, to an analytical framework oriented towards the social and historical construction of a seminal class of entrepreneurs in São Paulo.

As Cardoso (1965, p. 43) points out, the development of the metropolitan region of São Paulo was made possible by the introduction of a capitalist mentality into the economic circuit by the planters of the new coffee estates in the Western regions of the state.

On the one hand, the rationalization of coffee estates increased the productivity of the land through the implementation of professional management personnel as well as complex accounting systems to control the financial flows of the coffee economy as a capitalist enterprise (Cardoso, 1965; Cano, 1981). On the other hand, the rapid industrial expansion of the metropolis came into light as a consequence of the diversification of investments made by coffee planters in the thriving industrial sector of São Paulo in the dawn of the 20th century (Dean, 1969).

This new capitalist engine of accumulation was not only supported by the frenzied growth of the railroad system in São Paulo – which was a venture politically organized by coffee planters (Matos, 1973) – but also engendered by an immigration enterprise carried out by coffee planters in partnership with the state of São Paulo (Holloway, 1980). Not only did the massive flow of European immigrants to São Paulo help to create a broader consumer market for industrial products but it also shaped a capitalist economic space set into motion by the capitalist practices of the new workforce – a more positive attitude to work; a spirit of savings, which stimulated the emergence of the financial sector in São Paulo; an entrepreneurial spirit - many immigrants left the new coffee lands of Western São Paulo to start up manufacturing shops in the city and other immigrants came from different regions of Europe seeking

for business opportunities in the thriving economic space (Morse, 1970; Dean, 1969; Martins, 1973). Important industrial conglomerates today came to the fore as a result of the immigrant entrepreneurial burst in São Paulo, such as *Klabin*, *Votorantim* and *Villares* (Dean, 1969; Marcovitch, 2005).

In light of those seminal movements in the formation of the metropolis, it is important to contextualize entrepreneurship – the pushing through of new combinations in the economy – in such a way that the recombinant act it entails must reflect the specificities of social relations in a given territorial arrangement.

In São Paulo, more specifically, economic change emerged not only within the economy, as Schumpeter ([1911]2003) suggests, but also outside the economy, as Cardoso (1972) points out. The formation of the metropolis in São Paulo is an amalgamation of economic and extra-economic entrepreneurship in the sense that the transformation of the economy was partially organized in politics, as I will show in this chapter and in the next one.

In this context, it is important to compare Joseph A. Schumpeter and Fernando Henrique Cardoso in order to set up the stage for the second chapter of this dissertation – which consists of a historical reconstruction of the industrialization of São Paulo between 1880 and 1930.

2. Entrepreneurs as Political Actors: a dialog between Schumpeter and Cardoso

One of the most striking differences between the analyses of Joseph A. Schumpeter and Fernando Henrique Cardoso on entrepreneurship as a social action, on the one hand, and its practical implications, on the other hand, is

certainly related to the scope of social agents involved in the exploitation as well as in the achievement of the entrepreneurial function.

As a social type, the entrepreneur in Schumpeter and Cardoso performs different roles in the theaters of social life: as I will show, the Schumpeterian entrepreneur is a creative genius *inside* the economic realm, whereas the entrepreneur, in Cardoso's analysis, brings new combinations into light by promoting change in *extra-economic* spheres of society (Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1989; Cardoso, 1969; Cardoso, 1972; see also Fernandes, Cardoso, & Ianni, 1976).

2.1. The Schumpeterian Entrepreneur

In very basic terms, the Schumpeterian entrepreneur is a visionary in the realm of economic life. As a man of vision, the Schumpeterian entrepreneur breaks the customary ways in which goods are produced by anticipating new economic opportunities. A typical Schumpeterian entrepreneur exploits these new opportunities by engaging in new combinations of means of production in order to bring into light new products, new methods of production, new markets, new sources of production as well as new forms of industry organization (Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1989).

Consequently, the Schumpeterian entrepreneur is the main spark of change in capitalist society insofar as, according to the author, "the fundamental impulse that sets and keeps the capitalist engine in motion comes from new consumers' goods, new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates" (Schumpeter, 1942, p. 83).

Capitalist development is intrinsically related to technological change – or continuous innovations embodied either in products or in their productive

means (Schumpeter, 1934, p. 66; see also Schumpeter, 1942, pp. 82-83; see also Swedberg, 2009)². Schumpeter defines development as “the carrying out of new combinations” in already available productive means (Schumpeter, 1934, p. 66-68; see also Swedberg, 2000; Fagerberg, 2003).

In his classic statement on innovation, which he calls “development”, Schumpeter (1934, p. 66) avers that are five the main cases through which these new combinations come to the fore, which are as follows: 1) the introduction of a new good; 2) the introduction of a new method of production; 3) the opening of a new market; 4) the conquest of a new source of supply of raw materials or half-manufactured goods; 5) the carrying out a new organization. Schumpeter (1942) later argues that these new combinations are the essence of capitalist change.

It has to be said, at this point, that technological change, in Schumpeter’s view, is not restricted to innovative endeavors carried out inside organizations (e.g. the firm); rather, the Schumpeterian perspective on technological change leads to a socially comprehensive notion of innovation, which embodies “new combinations” that might take place in any of the phases of the productive circuit (Schumpeter, 1934; Knudsen & Swedberg, 2009; Swedberg, 2009).

In other words, innovation, according to Schumpeter’s views, assumes a circular dynamic that covers the production “circuit” as a whole, and not only the production of a new good *per se* - which is the final product of *how* the complementary elements of the “circuit” are intertwined. As a consequence, when Schumpeter talks about new combinations, it is clear that he is referring to the production “circuit” as a whole, in which the final product might be result of an innovation that is *not necessarily embodied in the final good* produced

² Following Fagerberg, it must be said that the first Schumpeterian definition of innovation - which was seen “as ‘new combinations’ of existing resources, equipment and so on” (Fagerberg, 2003, p. 131) - was termed “development” (see Schumpeter, 1934, p. 66).

but, instead, in some element of the “circuit” that is being recombined (Swedberg, 2009; Knudsen & Swedberg, 2009)³.

In this context, entrepreneurship emerges as a *specific social activity* that can be conceived of as being the capacity of individuals and organizations to put together already existing means of production (raw materials, resources, equipment, etc.) to the service of new (and marketable) productive combinations (Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1989; see also Fagerberg, 2003).

In Schumpeter’s words, “the function of entrepreneurs is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products, by reorganizing an industry and so on” (Schumpeter, 1942, p. 132)⁴.

³ This is one of the richest contrasting points in a comparison between Schumpeter and Cardoso, as we will see over the course of this paper. For both authors, entrepreneurship involves a recombination of elements that leads to an innovation in the production “circuit”. One of the most striking theoretical differences between Cardoso and Schumpeter is that the former and the latter have alternative perspectives on how far the production “circuit” can be “stretched” to produce a new combination (cf. Schumpeter, 1934; cf. Cardoso, 1972). In Schumpeter’s view, the production “circuit” is confined to the economic realm; for Cardoso, in turn, an innovation might take place by a recombination that goes beyond the economic realm, such as, for instance, the privileges attained by some economic agents at the level of the state that alter the dynamics of the “circuit” – e.g. a new institutional arrangement (protectionist measures, favourable regulatory environments, etc.) and new sources of subsidized state credit (Cardoso, 1969; Cardoso, 1972; cf. Schumpeter, 1934; Schumpeter, 1942).

⁴ It is beyond the scope of this chapter draft to analyze the vicissitudes of Schumpeter’s perspectives on entrepreneurship, which are frequently portrayed as “Schumpeter Mark I” and “Schumpeter Mark II” (Fagerberg, 2003; Freeman & Soete, 1997). For example, the decadence of the entrepreneurial function is a very important topic in Schumpeter’s work because it lies at the core of its theory of capitalism (see Schumpeter, 1942). According to Schumpeter (1942, p. 132), innovation would be “reduced to routine”, and this social activity would be performed by “teams of specialists” instead of being an endowment of a special type of individuals. Another important theme in Schumpeter’s approach to entrepreneurship is the analytical transition from the entrepreneur as an individual to the entrepreneur as a collective agent – e.g. a firm, where the entrepreneurial function is performed co-operatively (Schumpeter, 1989; see also Fagerberg, 2003; Swedberg, 2000). It must be noted that this collective perspective is largely ignored by the literature on entrepreneurship, probably because the focus of entrepreneurship as a discipline in business schools and economics is on new-firm startups. Frequently, this literature associates the meaning of entrepreneurship more strongly to new-firm startups (e.g. Gregoire, Noel, Dery, & Bechard, 2006; Audretsch, Keilbach, & Lehmann, 2006).

The Schumpeterian entrepreneur is, therefore, the main motor of economic change in capitalist societies. Following Schumpeter (1934), the basic social mechanism through which entrepreneurs ignite transformations in the customary channels of production is the *function of leadership*. In other words, entrepreneurs are the basic building blocks of innovation in the economic sphere; the function of leadership is the *raison d'être* of the Schumpeterian entrepreneur in that only leaders can splinter the bones of resistance that emerge from social habits and traditions hamstringing innovation (Schumpeter, 1934; Schumpeter, 1989, p. 229; Schumpeter, [1911]2002; Schumpeter, [1911]2003; see also Swedberg, 2006).

One of the most insightful points in the Schumpeterian analysis of leadership is the connection between social deviance and economic change. Insofar as economic change is brought into light through the recombination of means of production into new channels - which is the main element of innovation - individuals endowed with a *special capacity* of challenging as well as changing the habitual ways in which goods are produced become the main carriers of transformation in capitalist society. These individuals are leaders in the sense that they anticipate possibilities of recombining the means of production that are not readily available to ordinary (static) individuals who just follow the habitual ways of doing things (Schumpeter, 1989; see also Schumpeter, 1942; Schumpeter, [1911]2002; Schumpeter, [1911]2003).

Moreover, these leaders are deviant in the sense that they envision as well as reap economic benefits from innovation that ordinary economic agents are not able to see beforehand, since the latter are rooted in traditional methods of production – which Schumpeter terms the circular flow of economic life (Schumpeter, 1934).

According to Schumpeter (1934, pp. 84 and ss.), the circular flow of economic life tends to be reproduced by fixed habits of thinking with respect to production and consumption in such a way that the normal patterns of behavior of economic actors lead to the reproduction of the same production channels. In that context, socially deviant entrepreneurial leaders, for Schumpeter (1934), are special social actors because they break the routine as well as deeply rooted habits in order to recombine the factors of production into innovative products and new forms of organizing production and distribution of goods. Summing up, entrepreneurial leaders are socially deviant because they *react to habitual ways of doing things* in order to lead “means of production into new channels” (emphasis added) (Schumpeter, 1934, p. 87; see also Swedberg, 2006, pp. 25-6)⁵.

⁵ As Swedberg (2006, pp. 25-6) points out, “the sociological factor that prevents development from taking place is *other people* or rather other people who are static. When you try to do something new, other people tend to react negatively. Deviance is something that evokes this reaction in all societies, according to Schumpeter (...) People react negatively to deviance because they feel psychologically threatened; they are used to doing things in a familiar and ‘safe’ way”. With respect to this point in Schumpeter’s analysis, it is important to take into account that his concept of development is much more elaborated in the German edition of his *Theory of Economic Development* [*Theorie der wirtschaftlichen Entwicklung*, henceforth *Theorie*], which was originally published in 1911 (Becker & Knudsen, 2002). The notion of deviance in Schumpeter is related to deviant behavior *vis-à-vis* the innate tendencies of social agents to stay in the static state (Schumpeter, [1911]2002; Swedberg, 2006, pp. 25-6) in such a way that development – i.e. social change that emerges as a result of new combinations in all social spheres, not only in the economic field (Schumpeter, [1911]2002, p. 430) – comes to the fore as a consequence of entrepreneurial actions engendered by a new kind of social agent who reacts to the tendencies of societies to be in static state through its norms, beliefs and conventions (see also Swedberg, 2006; Becker & Knudsen, 2002; Shionoya, 1990). On this point, Schumpeter ([1911]2002, p. 409) avers that “many, and in particular the strongest individuals [entrepreneurial leaders], would behave different from what theorems of statics would lead us to assume. But how? They will create something new and destroy the old thing, conceive and carry out bold plans, which, whatever their nature, seem to ridicule any attempt of being grasped. The strongest individuals will subjugate their fellow citizens to their rule, they might influence the national politics and organization, change the natural course of the economy through legitimate and illegitimate means, and in any case through other means than merely ‘exchange’ (...)”. At this point, it should be emphasized that Schumpeter, in the first edition of *Theorie*, was seeking to integrate his theory of entrepreneurship into a more general social theory based on the core idea that entrepreneurial actions in all social spheres of society (politics, art, culture so on and so forth) bring about social change, which emerges as a result of the statics-dynamics dichotomy – an analytical standpoint that is pervasive in the first edition of the *Theorie* (Shionoya, 1990, p. 315; see also Becker & Knudsen, 2002; Swedberg, 2006). Despite the fact that deviance brings change into light – insofar as it encompasses a disruption in the ordinary course of social life –, Schumpeter ([1911]2002) does not seem to argue that deviant actors resort to either illegal or criminal means to promote change in the economy and other spheres of society. A Schumpeterian deviator, the leader, apparently reacts to social conventions and traditions deeply rooted in social norms thereby creating new forms of combining elements in his field of action, be it in arts, politics, science, so on

As a consequence, the phenomenon of leadership, in the Schumpeterian perspective, arises as a social mechanism that generates new knowledge on production and distribution of goods. For Schumpeter (1934, p. 84), then, “everything we think, feel, or do often enough becomes automatic and our conscious life is unburdened of it. The enormous economy of force, in the race and the individual, here involved is not great enough, however, to make daily life a light burden and to prevent its demands from exhausting the average energy all the same. But it is great enough to make it possible to meet the ordinary claims. This holds good likewise for economic daily life. And from this it follows also for economic life that every step outside the boundary of routine has difficulties and involves a new element. It is this element that constitutes the phenomenon of leadership”.

It should be emphasized that Schumpeter subsequently underscores that the function of leadership loses its importance as a motor of change in capitalism (Schumpeter, 1942, pp. 132-33). As the author highlights, innovation would be reduced to predictable tasks performed by teams of trained specialists in big corporations. Therefore, the role of visionary and risk-taker entrepreneurs who exploit innovation opportunities by engaging in new ways of combining factors of production fades away. The function of leadership, in that sense, tends to vanish in the wake of the gradual dismantling of capitalism as a system of production and consumption. Schumpeter (1942, p. 132) calls attention to the fact that “rationalized and specialized office work will eventually blot out personality, the calculable result, the ‘vision’. The leading

and so forth (Shionoya, 1990, p. 320). William Baumol provides a consistent definition of the Schumpeterian economic entrepreneur as a deviant actor, although it lacks the conceptual richness of the early Schumpeterian entrepreneurial leader: “(...) I use the word ‘entrepreneur’ in the Schumpeterian sense to mean the bold and imaginative deviator from established business patterns and practices, who constantly seek to introduce new products and new procedures, to invade new markets, and to create new organizational forms” (Baumol, 2002, p. 57).

man no longer has the opportunity to fling himself into the fray. He is becoming just another office worker – and one who is not always difficult to replace”.

At any rate, it is important to retain the seminal notion of leadership in Schumpeter’s work so that the comparison with Cardoso’s concept of the entrepreneur as political actor can be meaningfully advanced. As we will see, Cardoso (1969; 1972) also portrays the entrepreneur as a leader, albeit in a broader sense. In Cardoso’s view, the entrepreneur is a man of vision who mobilizes not only factors of production to bring into light new combinations but also resources outside the strict economic sphere (see also Fernandes, Cardoso, & Ianni, 1976).

Schumpeter neither delves into the relationship between the entrepreneur and his political aptitudes nor does he directly neglect the role of entrepreneur as a political actor in the sense that the latter mobilizes resources outside the economic arena to bring innovations into light. Nonetheless, it is clear in the Schumpeterian approach that entrepreneurs change the dynamics of capitalism by promoting new combinations of means of production. With respect to this point, Schumpeter makes a very clear argument positing that entrepreneurial leaders are not political leaders in the sense that they do not resort to the political arena in order to get innovations done. To put it bluntly, in the Schumpeterian strand of analysis, the economic kind of entrepreneurship and politics are two distinct domains of action marked by diverse types of leadership and individual propensities (Schumpeter, 1934; Schumpeter, 1942; for a slightly different perspective, see Schumpeter, [1911]2002; Schumpeter, [1911]2003)⁶.

⁶ In the first edition of Theory of Economic Development [*Theorie der wirtschaftlichen Entwicklung*, henceforth *Theorie*], published in 1911, Schumpeter applies the principles of economic entrepreneurship to all sectors that encompass the organization of society (Schumpeter, [1911]2002; Schumpeter, [1911]2003). In doing so, as I

Hence, in the Schumpeterian view, the entrepreneur is confined to the sphere of production in such a way that his actions are oriented to the carrying out of new combinations by recurring exclusively to factors of production and social agents *inside* the economic arena.

In other words, the Schumpeterian entrepreneur harnesses opportunities to change the course of economic life without having to reckon with social agents outside the spheres of production, consumption and circulation of capital. As for this point, Schumpeter says: “He [the entrepreneurial leader] ‘leads’ the means of production into new channels. But this he does, not by convincing people of the desirability of carrying out his plan or by creating confidence in his leading in the manner of a political leader – the only man he

have argued, Schumpeter was seeking to build a general model of social evolution based on his concept of development – i.e. a disruption in the static mode brought into light by individuals endowed with the special capacity of pushing through innovation in the various social fields by destroying the old as they create new combinations (Schumpeter, [1911]2002; Schumpeter, [1911]2003; see also Shionoya, 1990; Swedberg, 2006; Becker & Knudsen, 2002). In contrast with the English edition of *Theorie* - which was translated from the second edition in German that came out in 1926, in which the Seventh Chapter published originally in the first edition was omitted (Swedberg, 2006; Becker & Knudsen, 2002; Shionoya, 1990) -, the social role of the entrepreneur is much more comprehensive insofar as entrepreneurial leaders act as carriers of change in all sectors of society. Entrepreneurial leaders, therefore, are active in all areas of society as dynamic elements of social change based on new combinations or simply development, as Schumpeter terms (Schumpeter, [1911]2002; Schumpeter, [1911]2003; see also Swedberg, 2006; Shionoya, 1990). Following Schumpeter, an analogy ensues between entrepreneurial leadership in the economic sphere and leadership in extra-economic fields of society: “there is a further analogy between what we presented first for the field of economics, and the processes in the other areas of social life. It is concerned with the mechanism of development, with that relatively autonomous development which is characteristic of every single field of social life. We said that each of these fields is characterized by a real group of individuals, whose main activity they with respect to that chosen field, but who as individuals may also be active in other fields, *e.g.* people belonging to economic professions may also be politicians or may interest themselves in art; or politicians, and artists, may also be economic agents (...) In each field there are statically disposed individuals and there are leaders. The former are characterized by doing in essence what they do; they are moving in a frame that is outmoded, and they are dominated in their views, in their dispositions and in their activity by the determining influence of the circumstance prevailing in their area. The latter, by contrast, are characterized by their perception of what is new; they change the outmoded frame of their activity, as well as given data of their area” (Schumpeter, [1911]2003, p. 109). As we see here, Schumpeter applies his concept of entrepreneurial leadership, which is the motor of development, to non-economic fields of society (*e.g.* politics, arts, culture, religion, science, etc.), a perspective lacking in the English version of his book, which came out in 1934, in that the Seventh Chapter was completely removed from the latter (cf. Schumpeter, 1934; see also Shionoya, 1990; Swedberg, 2006; Becker & Knudsen, 2002). The adoption of the concept of economic entrepreneurship to understand innovation in all spheres of society (arts, politics, science, etc.), as is clearly the case in Schumpeter’s seminal analysis (Schumpeter, [1911]2003), does not resemble the argument that the *mobilization of extra-economic resources* might be oriented to bringing *innovation in the economic field* into light (*e.g.* Cardoso, 1972; Barth, 1963; Hwang & Powell, 2005).

has to convince or to impress is the banker who is to finance him – by buying them or their services, and then using them as he sees fit. He also leads in the sense that he draws other producers in his branch after him” (Schumpeter, 1934, p. 89).

Furthermore, Schumpeter indirectly denies the role of entrepreneurs as political actors in his analysis of the social and economic reproduction of capitalism carried out by the bourgeois class. Successful entrepreneurs, according to Schumpeter, constitute the dynamic agents of reproduction of the bourgeois as a social class because flourishing entrepreneurial ventures tend to become firmly established businesses, thereby consolidating the position of entrepreneurs and their families in the making of the bourgeoisie as a social class (Schumpeter, 1942; see also Schumpeter, 1989). As Schumpeter points out, “though entrepreneurs do not *per se* form a social class, the bourgeois class absorbs them and their families and connections, thereby recruiting and revitalizing itself currently while at the same time the families that sever their active relation to ‘business’ drop out of it after a generation or two (...) Economically and sociologically, directly and indirectly, the bourgeoisie therefore depends on the entrepreneur and, as a class, lives and will die with him (...)” (Schumpeter, 1942, p. 134).

Summing up, Schumpeter (1942) makes a connection between economic leadership, which is deeply embodied in entrepreneurship, and the reproduction of the bourgeoisie as a social class. For this reason, the existence of social groups that - through their positive attitudes towards innovation and “industrial leadership” - ignite change in capitalism depend on successful entrepreneurs who bring into light new businesses practices as well as new products and services to the market (see also Schumpeter, 1989, p. 230).

The kind of leadership exerted by entrepreneurs who end up being merchants and industrialists, according to Schumpeter (1942, p. 137 and ss.), is essentially intertwined with the economic realm. As a consequence, the typical bourgeois in the business arena, who was also an entrepreneur at some point, is a man concerned with the quotidian routine of carrying out his business motivated by utmost ambition of maximizing profits and reducing costs.

For Schumpeter (1942), as I have shown, the economic type of leadership that paves the way for entrepreneurs to become members of the bourgeoisie class has nothing to do with charismatic or heroic attributes of political and military leaders who are endowed with the ability to convince entire nations to follow their authority.

The Schumpeterian entrepreneur, therefore, is a man restrained to the boundaries of his business. On the entrepreneurial leader, Schumpeter says: “there is surely no trace of any mystic glamour about him which is what counts in the ruling of men. The stock exchange is a poor substitute for the Holy Grail. We have seen that the industrialist and merchant, as far as they are entrepreneurs, also fill a function of leadership. But economic leadership of this type does not readily expand, like the medieval lord’s military leadership, into the leadership of nations. On the contrary, the ledger and the cost calculation absorb and confine” (Schumpeter, 1942, p. 137).

Considering the social paths that conduct the entrepreneur to his role as a typical bourgeois in the habitual management of his trade, it might be argued that, in the Schumpeterian analysis, the normal trajectory of a typical entrepreneur spans from an insightful perception of an innovative opportunity in the economic sphere to the foundation of a firm so that the “new combination” can be carried out. As time goes by, the risk-taker and

visionary entrepreneur becomes a conservative manager-owner, thereby the “seminal” entrepreneurial function vanishes away in the wake of customary ways of doing business (Schumpeter, 1989).

In his social trajectories to become a typical bourgeois, the Schumpeterian entrepreneur is not a political actor. Entrepreneurs as political actors, following Cardoso (1972), engage in social relations with members of the political arena to negotiate financial resources and institutional privileges so that the innovation opportunities they perceive can be attained (see also Fernandes, Cardoso, & Ianni, 1976). Therefore, the Schumpeterian entrepreneur mobilizes resources almost exclusively from the private sphere seeking a private benefit, which is embodied in new combinations of means of production.

As we will see, the entrepreneur for Cardoso (1972) is a man who mobilizes resources from both private and public spheres envisaging not only private benefits in the business arena but also public benefits in terms of institutional as well as financial resources that affect the levels of innovation and capital accumulation at the level of firms and entire industrial sectors (see also Fernandes, Cardoso, & Ianni, 1976).

Conversely, as I have pointed out, the Schumpeterian entrepreneur, transfigured into a typical bourgeois, is a man concerned with the quotidian routine of his business. As Schumpeter (1942, pp. 137-38) argues, the typical bourgeois is not endowed with the charismatic kind of leadership that would make him a talented political actor. Hence, the typical entrepreneur, in his social path to the bourgeoisie, is a man who neither convinces people by his crowd-puller speeches nor is he a man capable of embarking on flamed debates as well as arduous negotiations on the distribution of resources that decide the fate of a nation.

Schumpeter (1942, p. 138) then asserts that the bourgeois “can only use rationalist and unheroic means to defend his position or to bend a nation to his will. He can impress by what people may expect from his *economic performance*, he can argue his case, he can promise to pay or threaten to withhold it, he can wire the treacherous services of a condottiere or politician or journalist. But that is all and all of it is greatly overrated as to its political value. Nor are his personal experiences and habits of life of the kind that develop personal fascination. A genius in the business office may be, and often is, utterly unable outside of it to say boo to a goose – both in the drawing room and on the platform. Knowing this he wants to be left alone and to leave politics alone”.

Henceforth I will explore Cardoso’s views on entrepreneurship focusing on the role of entrepreneurs as political actors (Cardoso, 1969; Cardoso, 1972; Fernandes, Cardoso, & Ianni, 1976). In doing so, I will explore Cardoso’s critique to Schumpeter’s conceptualization of entrepreneurship so that a broader notion of entrepreneurship, which goes beyond the realm of economy, can be drawn.

Cardoso’s approach to entrepreneurship, I aver, is a complementary perspective to the Schumpeterian analytical framework inasmuch as Cardoso’s analysis places the entrepreneur in a broader scope of social relations. In that sense, I believe that bringing back Cardoso’s angles on entrepreneurship - which have been forgotten by Brazilian sociology – is a contribution to a research agenda in the social sciences proposed by Swedberg (2000).

Swedberg (2000) argues that the social sciences have an important role in the understanding of entrepreneurship from novel theoretical and practical standpoints; on the other hand, the author points out that entrepreneurship as

a practical endeavor and as a theoretical construction should incorporate social actors commonly left aside in the scholarship.

The social sciences, Swedberg affirms, “can provide new and fresh ideas about the theory and practice of entrepreneurship, by looking at innovative business behavior in other times, in other societies, and in other cultures – and also by looking at entrepreneurship from novel angles and from the perspective of a much wider range of actors than it is commonly done” (Swedberg, 2000, p. 7).

A critical appraisal of Cardoso’s insightful conceptualization of entrepreneurship, I argue, can cogently be incorporated into the research agenda proposed by Swedberg (2000) for two basilar reasons.

First, Cardoso’s seminal analysis of entrepreneurship places the entrepreneur at the center of processes of social change (development) engendered beyond the scope of the circulation of capital.

Second, a recombination of the means of production, following Cardoso (1972) and Fernandes (1976), mobilizes not only opportunities inside the realm of economy – as Schumpeter (1934; 1942) argues –, but also possibilities of innovation that can only be accomplished through the interaction between the entrepreneur and other spheres of society, such as the state and the political class.

Nonetheless, as I will try to show, the entrepreneur in Cardoso (1969; 1972) is not a passive actor who occasionally “buys the services” of politicians from the desk of his enterprise - to paraphrase Schumpeter (1942) – but an engaged political actor who convinces social agents in key positions in *extra-economic* arenas of society so that innovation can take place (see also Fernandes, 1976; Fernandes, Cardoso, & Ianni, 1976).

As Florestan Fernandes points out, “(...) the industrial entrepreneur has become the main active character of economic growth in the Brazilian contemporary society (...) [the entrepreneur] should comprehend, as a ‘technician’, the economic mechanisms in which he is inserted, through his industrial endeavor, and should also react as a ‘captain of industry’ in order to intelligently harness technological innovations, financial opportunities, and *political arrangements* of immediate reach” (Fernandes, 1976, p. 323-24) (emphasis added)⁷.

In the next section, I will peruse the recent Brazilian scholarly production on entrepreneurship in order to incorporate a debate between Schumpeter and Cardoso into a theoretically and empirically meaningful agenda for entrepreneurial studies in Brazil.

2.2. *Fernando Henrique Cardoso: entrepreneurship, politics, development*

As surprising as it may be, Cardoso’s perspectives on entrepreneurs as political actors, which lie at the core of his main work on the sociology of

⁷ Although Fernando Henrique Cardoso is widely acknowledged for his seminal studies on the social formation of the Brazilian industrial bourgeoisie and, in particular, the role of industrial entrepreneurs in the rationalization of capitalist social practices in Brazil, it was Florestan Fernandes who organized the research project entitled “Economy and Society in Brazil: a sociological analysis of underdevelopment” originally published in 1963 (Cardoso, 1972, p. 5). This research project was one of the backbones of the research agenda addressed by the so-called “São Paulo Sociological School”, which incorporated theoretical and methodological principles of European and North American Sociology – the “São Paulo Sociological School” was deeply influenced by authors such as Talcott Parsons, Robert K. Merton, Karl Mannheim, Max Weber, Emile Durkheim and Karl Marx. Basically, that pioneer research project in the field of Economic Sociology in Brazil was oriented to the sociological comprehension of the rapid industrial change in Brazil and its socio-economic consequences. According to Fernandes (1976, p. 318), the path to modernization and rationalization of Brazilian society is intrinsically related to the “mentality of the entrepreneur, decisive element to the comprehension of economic growth as well as the tendencies of consolidation of a competitive social order in the Brazilian society”. As a post-doctoral research assistant to Florestan Fernandes in the Department of Sociology at the University of São Paulo, Fernando Henrique Cardoso undertook the study on entrepreneurial mentality, the connections between entrepreneurs and the State as well as the political class, and its consequences for economic development in Brazil - which was one of the central topics in Florestan Fernandes’ germinal research project (Fernandes, 1976; Fernandes, Cardoso, & Ianni, 1976). Cardoso’s research on the role of industrial entrepreneurs and the Brazilian industrial bourgeoisie in the modernization of the Brazilian economy was defended as a post-doctoral dissertation (“livre-docencia”) in the Department of Sociology at the University of São Paulo in November 1963 (Cardoso, 1972, p. 5; see also Garcia Jr., 2005).

entrepreneurship, have been neglected by the literature that deals with business groups and entrepreneurship in Brazil⁸.

For one thing, most of the scarce literature on the connection between entrepreneurship and politics in Brazil takes entrepreneurs and businessmen (or business groups) as two interchangeable conceptual categories (see, e.g. Iglécias, 2007; Mancuso, 2004; Mancuso, 2007; Bresser-Pereira, 2007; Evans, 1979; Evans, 1995). Under the theoretical and empirical assumptions of this analytical perspective, “entrepreneurs” are conceptually linked to business groups and class associations (e.g. employers’ associations) that are organized around common interests in the political arena – for instance, the reduction of the tax base in Brazil and the protection of some industrial sectors against “predatory” trade practices brought into light by the trade liberalization experienced by Brazil during the neo-liberal wave of the nineties (Mancuso, 2007).

Nonetheless, this analytical angle is only concerned with the political engagement of businessman and business groups – the use of the term entrepreneur is inappropriate in this case because it does not refer to the entrepreneurial function, i.e. the circuit of innovation that spans from recognizing an innovation opportunity to its accomplishment through a special capacity of recombining productive means into new commodities and new organizations.

In other words, this literature is concerned with the political engagement of businessmen as well as business groups in the political arena, regardless of their innovative potential in the economic realm; it does not matter if firms

⁸ For extensive reviews of that literature, see Bresser-Pereira (1984), Bresser-Pereira (2007), and Mancuso (2007).

that have privileges in attaining benefits in extra-economic spheres of society will employ those benefits in innovative activities.

In addition, more recent scholarship on entrepreneurial activities in Brazil defines entrepreneurship *exclusively* as intra-firm innovation or the creation of new organizations (firms). Accordingly, the classical Schumpeterian entrepreneurial function is, in this vein of analysis, bounded to *only* one aspect of the knowledge circuit between the recognition as well as exploitation of innovation opportunities and the accomplishment of these opportunities embodied in new combinations of productive means – new “marketable” products or new industrial organizations (cf. Arbix & De Negri, 2005; cf. Arbix, 2008).

In a recent article, Arbix (2008, p. 1) argues that “entrepreneurship can be defined as the ability to transform an idea into a market reality by means of a firm. Entrepreneurial behavior refers to the ability to develop new business via the creation or structural remodeling of companies. Entrepreneurs promote corporate strategy building, founded on knowledge-intensive activities”. Entrepreneurship, following these analytical lenses, is devoid of its *special function* in the Schumpeterian sense, since it is not explained, in such a definition of the term, how “an idea” can be exploited through a *special capacity* of economic agents to recognize an innovation opportunity and break the routine in terms of production and distribution (see Schumpeter, 1934; Schumpeter, 1942, p. 132).

Despite its undeniable merits as a pioneer effort to provide a conceptual framework for the comprehension of entrepreneurial activities in Brazil, such a vision of entrepreneurship is disconnected from broader social contexts that pave the way for innovation-related activities to emerge - e.g. the relationship

between entrepreneurs and the state (Cardoso, 1972) or intra-firm power struggles (Cardoso, 1972; see also Bourdieu, 2005).

As a result, this analytical orientation assumes that economic agents have the same capacity to pursue an innovation opportunity (“an idea”) and transform it into marketable products or new industrial organizations, thereby decoupling entrepreneurship from the power struggles for resources that create unequal conditions for innovation, as Cardoso points out (Cardoso, 1972; see also Fernandes, Cardoso, & Ianni, 1976). Frequently, these power struggles are materialized in extra-economic spheres of society, a fact that is also ignored by the theoretical scholarship that binds entrepreneurship *only* to intra-firm innovation (cf. Arbix, 2008; cf. Arbix & De Negri, 2005).

Moreover, if we take Schumpeter as a conceptual reference, defining entrepreneurship exclusively as intra-firm innovation and organization-building entails some theoretical and empirical pitfalls.

First, intra-firm innovation, as it appears in datasets on innovative efforts undertaken by firms (such as R&D activities), is sometimes purely incremental; thus, it might not involve any kind of innovation opportunity translated into new products and markets – or “untried technological possibilities”, as Schumpeter argues (Schumpeter, 1942, p. 132; see also Amsden & Tschang, 2003; Fagerberg, 2005; Queiroz & Carvalho, 2005).

Second, the creation of new firms does not necessarily involve breaking the routine in terms of the customary flows of production and circulation of goods (Baumol, 2002, p.57). Logically, if we once again resort to the Schumpeterian analytical tradition, the creation of new firms *per se* – or even new organizational structures inside a firm – does not immediately conduct to

the production of a new good or the production of a commodity in a new way, as Schumpeter avers (Schumpeter, 1934; Schumpeter, 1942)⁹.

Although the perspectives explored above are constructive in terms of addressing a research agenda oriented towards entrepreneurial dynamics in Brazil, they are conceptually and practically incomplete analytical tools as regards the relationship between the entrepreneurial function, in the Schumpeterian sense, and extra-economic spheres of action. To put it bluntly, those two approaches to entrepreneurship in Brazil fail to answer the following question: what is the relationship between the entrepreneurial function (opportunities for innovation) and extra-economic social institutions, such as the political arena?

Following Cardoso's perspective in a critical way, it is possible to see that, in some cases, entrepreneurial opportunities that lead to innovative products, new markets and new organizations can *only* be exploited *if* entrepreneurial leaders are able to build a set of social relations outside the boundaries of the firm (Cardoso, 1972). Frequently, the *circuit of innovation* can only be carried out if entrepreneurial leaders draw on resources – financial and institutional – that can only be attained through a set of privileged social relations with actors in non-economic arenas of society¹⁰.

⁹ For a different perspective on small as well as new firms and entrepreneurship, Acs & Audretsch (2005); and Audretsch, Keilbach, & Lehmann (2006). Basically, these authors challenge what they term the “conventional wisdom” in terms of innovation, which is associated to “the Schumpeterian Hypothesis” that large organizations are the motors of processes of economic change derived from innovative economic endeavors.

¹⁰ Swedberg (2006, p. 21), following the ideas of the young Schumpeter I have already explored above, points out that “one of the most interesting advances in entrepreneurial thought is the idea that the notion of innovative or entrepreneurial behavior, which was originally invented to deal exclusively with economic phenomena, is today also used to explain what happens in social or non-economic areas of society”. Although this is a compelling argument as to how entrepreneurship takes place in non-economic social spaces, as the young Schumpeter argued (e.g. Schumpeter, [1911]2003), my analytical position is that entrepreneurial behavior in the economic arena that leads to innovation is intrinsically related, in some contexts, to mobilization of resources outside the strict realm of economy. As a consequence, the entrepreneur is also a political actor, since he or she has to be perspicacious to influence actors in other areas of society so that they can bring innovative commodities into light. In this sense, the innovation circuit is

In this regard, Cardoso (1972, p. 31) argues that entrepreneurship involves a “total decision” (economic, social, political), inasmuch as innovative economic agents “hold the *dominant position*, which is located at the intersection between the firm (or organization) and the remaining social institutions with which it interacts, such as the state, the financial system, political parties, other firms, trade unions, industrial federations, etc.”

Along those lines, the neglect of a prolific dialog between Cardoso (1972) and Schumpeter (1934; 1942; 1989) might leave us with an incomplete picture of entrepreneurship as a social function that embodies new combinations in the realm of economy (Schumpeter, 1934; Schumpeter, 1942) as well as new combinations in extra-economic fields of society that reverberate in the circular flow of economy in the form of innovations in markets, commodities and economic organizations (Cardoso, 1972; see also Fernandes, Cardoso, & Ianni, 1976).

As I have argued, the scope of entrepreneurship involves social relations beyond the sphere of economy, in such a way that the circuit of innovation spans from recognizing an innovation opportunity to getting it done through the mobilization of resources in social spaces other than the economy¹¹. With respect to this point, i.e. the “extension” of the circular dynamics of production to extra-economic spheres of society so that new combinations

accomplished *beyond* the realm of the economy - the entrepreneurial function itself (e.g. intra-firm innovation) is carried out through mobilization of non-economic resources, such as political influence in state bureaucracy and political institutions (Fernandes, Cardoso, & Ianni, 1976; Cardoso, 1972; Barth, 1963).

¹¹ For instance, the Brazilian excellence in ethanol production, based on knowledge-intensive efforts to develop new forms of “biofuels” derived from sugar cane (the recognition of an innovation opportunity by economic agents in this field), is only possible because sugar cane producers in São Paulo – the so-called “sugar barons” [*usineiros*] have exerted their secular political power over the political institutions in Brazil and their privileged access to state channels of credit so as to boost innovative output in “biofuels” production at a rapid pace. For a very good review of the historical relationships between sugar cane producers and the Brazilian state, see Iglesiás (2007); on the economic side of innovations in ethanol production and the formation of an innovation system in the state of São Paulo oriented to the development of new technology in sugar cane production, see Ueki (2007).

can be materialized, one of the most insightful aspects of the “unspoken” debate between Fernando Henrique Cardoso and Joseph Schumpeter emerges.

Cardoso (1972) points out that, in contemporary capitalism, innovation is carried out through new combinations of productive means accomplished by teams of specialists inside the organizational structure of a firm. Therefore, Cardoso (1972) goes on, innovation is reduced to routine, since it is “result of the specialized work of technicians, scientists, market specialists, etc. In a word: they are part and parcel of the daily routine of a firm” (Cardoso, 1972, p. 30). Although this argument is similar to what Schumpeter (1942) said in *Capitalism, Socialism, and Democracy* - as he delves into the decline of the entrepreneurial function - Cardoso (1972) argues that the entrepreneurial function does not reside exclusively in that bureaucratic schema of bringing new combinations into light.

For Cardoso (1972, p. 30-31), it is true that innovation is reduced to routine, as Schumpeter (1942) similarly argues, but it is just a partial picture of contemporary capitalism. As Cardoso (1972, p. 30-31) says, in his most insightful argument about the entrepreneurial function, there is a “logical step” before a new combination can be transformed into routine in an organizational structure of a firm. Basically, Cardoso (1972, p. 30 and ss.) avers that innovation becomes routine in a bureaucratized firm because of a sequence of economic and social decisions that go beyond the boundaries of the firm. In other words, the entrepreneurial function – i.e. the capacity of envisaging as well as pushing through new combinations of productive means - cannot be accomplished *exclusively* inside the firm inasmuch as some of the factors that determine the success of that new combination are external to the

firm and partially connect to extra-economic social spaces, such as the state and its bureaucracy, the political institutions, so on and so forth¹².

Despite the fact Cardoso (1972, p. 30 and ss.) does not state it clearly, his approach to entrepreneurship seems to have a two-pronged and dynamic functioning. It is two-pronged because the entrepreneurial function is made of new combinations that are “getting done” at the intersection between the firm and other social institutions. Before a new economic combination takes place, e.g., in the customary channels of a R&D lab in a firm, as Cardoso (1972) would probably have argued, some decisions have to be made, for instance, about *how* to accomplish that new combination in light of market situations, the necessary political connections to draw resources for the venture, the institutional arrangements that would make the new combination less

¹² It is important to underscore, at this point, that Cardoso (1972) was not the first author to bridge entrepreneurship and political institutions (e.g. Barth, 1963). On the one hand, the novelty of Cardoso’s argument, at his time, resided in his theoretical perspectives connecting firms as well as business groups to privileged channels in the state bureaucracy – an analytical theme that pervades economic sociology nowadays (e.g. Granovetter, 2005; Granovetter, 2007; Fligstein, 2001). On the other hand, Cardoso’s approach to the relationship between entrepreneurship and political structures, albeit advanced earlier by Barth (1963), is much richer conceptually because Cardoso (1972) cogently argues that the “circuit” of innovation stretches beyond the economic realm through the recombination of economic and extra-economic institutions, which goes beyond the strict production-distribution-consumption circuit (for a similar argument, see Hwang & Powell, 2005). Although entrepreneurs in Barth (1963) and Cardoso (1972) mobilize political resources in order to bring innovation into light, the relationship between entrepreneurs and state bureaucracy radically differs in their approaches. In that sense, the entrepreneur as a political actor in Barth’s analysis is an individual endowed with a special capacity of mediating between the needs of his community and the resources provided by the state to generate the conditions for business innovation (Barth, 1963). Therefore, the entrepreneur, according to Barth, is essentially a *broker* in that he mobilizes resources from the state, which will affect the entrepreneurial opportunities in entire communities. As Barth (1963, p. 16) points out, “(...) entrepreneurial opportunities are predominantly to be found in mediating roles, where new links are being created between local communities and central or national organizations – i.e. the entrepreneur becomes a broker (...) This is the niche where he can find most clients: persons who need and desire goods, services and leadership, who are unable by traditional means and skills available to them to what they wish. It is also the niche where he can most readily raise the capital needed for enterprises: the loans, subsidies and technical assistance which the Welfare State offers to ameliorate and remedy conditions in the area”. Consequently, for Barth (1963), the entrepreneur does not push for new combinations in the extra-economic spheres of society; rather, he just mobilizes resources from the latter. Finally, Barth’s approach to entrepreneurship does not capture the connection between the bureaucratic order of firms and the state as well as other extra-economic institutions as a means of promoting new combinations in the economy, as Cardoso (1972) does.

profitable or unfeasible (e.g. some legal impediment), the state bureaucracy, the political class so on and so forth.

Hence, Cardoso's perspective on the entrepreneurial function is two-pronged because a "new combination" emerges as a "fusion" of two new combinations that happen simultaneously and dynamically – one which is economic in nature; another one which is essentially extra-economic. In other words, the notion of entrepreneurial function in Cardoso (1972) comes to the fore as a consequence of re-combinations of social factors beyond the realm of the economy itself (see also Fernandes, Cardoso, & Ianni, 1976).

Accordingly, Cardoso (1972) theoretically stretches the circuit of innovation by linking intra-firm innovation with new combinations in society as a whole, which pave the way for the former to be carried out.

In line with his two-pronged perspective on innovation, Cardoso argues that the entrepreneurial function, in a capitalist economy, stretches beyond the economic sphere by saying that "[the act of] innovating, in the contemporary economy, is to be able to control the set of results of a proposed change, not only at the level of the firm [*empresa*] but also at the level of the economic order as well as the general [*global*] social order (...). In the highly bureaucratized firm of the contemporary capitalism, innovation depends, much more on the decision mechanisms in light of the *set* of social facts, than on the individual qualities of an entrepreneur. The firm, rather than the [individual] entrepreneur, constitutes the subject of the economic process" (Cardoso, 1972, pp. 30-31)¹³.

¹³ It is important to emphasize that Cardoso (1972) did not have a clear picture of Schumpeter's intellectual evolution when it comes to analyzing entrepreneurship. Accordingly, Cardoso (1972), in his dialog with Schumpeter on entrepreneurship, nurtures the visions of the young Schumpeter (or "Schumpeter Mark I") on the entrepreneur so as to portray the latter as an "inventive talent" disconnected from broader social arrangements, such as the firm, the state and other social institutions. Although Schumpeter did not go so far to say that the entrepreneur is a political actor and that the circuit of (economic) innovation can often be "stretched" to non-economic arenas of society, his intellectual evolution as a theoretician of entrepreneurship

At this point, a more crystalline picture of the entrepreneur as a social agent comes to the fore in Cardoso's analysis. First and foremost, the function of leadership that fabricates the entrepreneur as an agent of social change can only be carried out inside an organization (Cardoso, 1972, p. 42 and ss.). In that sense, the entrepreneur as an economic and political actor, according to Cardoso (1972), is enmeshed, on the one hand, in power struggles inside the structure of the firm in such a way that those struggles will influence the fate of intra-firm innovation; on the other hand, the entrepreneurial leader acts at the intersection between the organization of the firm and the social institutions that are mobilized so that the circuit of innovation can be completed (see also Fernandes, Cardoso, & Ianni, 1976)¹⁴.

As Cardoso argues, "(...) the leading elites of the economy in the contemporary capitalism have become, simultaneously, political elites: going beyond the angle of vision that the firm alone permits is an imperative to guarantee the success of the firm itself (...) It is easy to comprehend that the 'new situation' has led to a redefinition of the concrete requisites for the accomplishment of the entrepreneurial function [função criadora]: innovation, which is formally the role of any leading group, will depend, in order to be carried out in the contemporary capitalist [economic] activity, not only on the 'inventive talent' (...) but also on the capacity of persuasion as well as political

– which went hand in hand with the tendencies of bureaucratization of the capitalism of big firms – led him to argue that the entrepreneurial function was performed by organizations, such as firms and state agencies (Schumpeter, 1942; Schumpeter, 1989). Consequently, Schumpeter argues: "(...) as has been often pointed out, the entrepreneurial function need not be embodied in a physical person and in particular in a single physical person (...) Again, the entrepreneurial function may be and often is filled co-operatively" (Schumpeter, 1989, pp. 260-61; see also Schumpeter, 1942; Fargerberg, 2003; Swedberg, 2000).

¹⁴ Cardoso (1972) explores the theme of entrepreneurship from the angle of power struggles inside the firm. Inasmuch as Cardoso (1972) visualizes the firm as a bureaucratic arrangement engendered by divergent mentalities and attitudes towards management, in general, and towards innovation, in particular, he is, in my view, anticipating a concept later developed by Pierre Bourdieu, i.e., the firm as a field (see Bourdieu, 2005, pp. 205-207). Sometimes Cardoso's Weberian approach leads him to define innovation as a re-combination of two or more bureaucratic 'orders': for example, the firm and the state; the firm and the political institutions.

pressure of firm leaders [chefes de empresa]. Hence, at the level of the relationship between economic groups and the state, obtaining new governmental contracts and impelling the government to [adopt] strategies that pave the way for the continuation of prosperity are conditions to the accomplishment of growing profits (...)” (Cardoso, 1972, p. 42).

As I have extensively argued, Cardoso (1972) redefines the Schumpeterian concept of entrepreneurship by stretching the circuit of innovation out in order to encompass non-economic arenas of society. In that sense, the entrepreneurial function entails, as I pointed out, a two-pronged social form. Hence, the entrepreneurial function – i.e. the capacity of anticipating as well as pushing through new combinations – can *only* be consummated as result of new combinations of productive means preceded by new combinations in extra-economic spheres of society that pave the way for the former to come into light (Cardoso, 1972).

In order to carry out that two-pronged entrepreneurial function, the entrepreneur, according to Cardoso (1972, p. 42 and ss.), assumes not only a role of leadership in the economic sense but also a role of leadership in the political sense. Up to a point, Cardoso (1972) retains the classical Schumpeterian concept of entrepreneurship, since Cardoso also avers that the entrepreneur, as a social type, is a leader in the sense that he recombines productive means so as to create new products, new markets and new productive organizations – in such a way that these new combinations are oriented towards the reproduction of capitalism because their utmost ambition is the generation of profits. In addition to the classical Schumpeterian approach to entrepreneurship, nonetheless, Cardoso (1972) delves into the concept of leadership so that he can conceptually construct his double-faced notion of entrepreneurship.

In Cardoso's argumentation, the function of leadership, in contemporary society, has two facets: the entrepreneurial leader recombines factors of production so as to bring into light new combinations in terms of products, industrial organizations and markets; furthermore, the entrepreneurial leader is a political leader in the sense that he engenders new combinations in extra-economic spheres of society so that new economic combinations may be brought into light. Last but not least, the entrepreneurial leader, according to Cardoso (1972), is also a political leader in the sense that he leads his firm to the accomplishment of the entrepreneurial function by boosting the adoption new combinations of productive means as well as by mobilizing resources outside the realm of the firm oriented towards entrepreneurial profits¹⁵.

Summing up, it can be argued that entrepreneurial leaders, in Cardoso's analytical perspective, fulfill a "double function": 1) they undertake the entrepreneurial function seeking to bring new combinations in the form of innovations into light in order to make profits; 2) they undertake the entrepreneurial function by influencing extra-economic spheres of society so that they can obtain resources and institutional advantages for their firms (Cardoso, 1972, p. 44; see also Fernandes, Cardoso, & Ianni, 1976; Cardoso, 1966).

Consequently, the entrepreneurial function, analyzed from Cardoso's theoretical lenses, embodies a political component that is not embraced by the

¹⁵ As I have already argued, Cardoso (1972) sees, in the same fashion as Bourdieu (2005), the firm as a bureaucratic social structure in which the decisions as regards innovation come to the fore as a result of power struggles between the social agents in the bureaucracy with leverage to influence strategic decisions inside the firm. Consequently, the entrepreneurial leader, in line with Cardoso's perspective, might also be a political leader inside the structure of the firm. Cardoso (1972, p. 43) contends that new entrepreneurial functions emerge as a consequence of a more "complex web" of social relations in the economic realm: "(...) the fundamental transformation [has to do with] the complexity of relationships between various groups that operate in connection with the firm (shareholders, legislators, administrators, financiers, technicians, state bureaucrats, consumers). This complex web of relationships has entailed new entrepreneurial functions, which take a more global vision rather than the inventive talent itself: the entrepreneurial leadership has been redefined (...)" (Cardoso, 1972, p. 43).

Schumpeterian conceptualization of entrepreneurship. Recalling Schumpeter's main arguments when it comes to entrepreneurship, the author is only concerned about the accomplishment of new combinations that take place in the economic circuit of innovation; as I have argued, Schumpeter sees the entrepreneurial function as a recombination of productive means already available *inside* the economic realm in such a way that the entrepreneur is a social agent confined to the circular flow of economy (Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1989).

Undoubtedly, Schumpeter did not see economic innovation as being an outcome of the pushing through of new combinations in extra-economic arenas of society so that resources can be channeled to entrepreneurial endeavors (cf. Schumpeter, 1942). As Cardoso highlights, "(...) Schumpeter did not see the entrepreneur as a 'political actor', because economy and politics, at his time, were not two clear complementary faces of the same system of life (...) fundamentally, 'innovation' was meaningful only when it generated profits, and it would have been necessary to show that an economic structure oriented to profit-making presupposes [social] relations of domination and, therefore, 'political' [in principle], in order to understand that, at the time of the industrial capitalism, the functions of entrepreneurs were also 'political' [in principle]" (Cardoso, 1972, p. 44; see also Cardoso, 1966).

On the one hand, the entrepreneur is a political agent, cogently with Cardoso's analytical standpoint, in that he is intertwined with power struggles in the context of the firm which, in turn, affect the possible paths that an innovation might take inside the firm as an economic organization. Resorting to a *Weberian* conceptual framework, which Cardoso does not mobilize explicitly, it is reasonable to argue that the entrepreneurial function, as an

intra-firm endeavor, involves a component of bureaucratic-rational domination engendered by the legitimacy of strategic social actors in the firm who lead the recombination of productive means into new products, new industrial processes and markets (cf. Cardoso, 1972; cf. Weber, 1978).

Insofar as the strategies of firms as regards innovation come into light as a result of power struggles inside the firm – e.g. there might be divergences about how much to invest in the pursuit of a new combination, the entrepreneurial function also involves power alliances inside the firm in face of risk and uncertainties as to how a particular innovation-oriented strategy, which is normally selected among a myriad of possible alternative innovative paths, is going to generate the expected profits (see also Bourdieu, 2005, pp. 205-207).

On the other hand, the entrepreneur, as a social type, is a political actor because he acts at the interconnection between the firm and extra-economic institutions – mainly the state - which provide the organizations in which entrepreneurs are “embedded” (e.g. firms) with resources that might be deployed to the attainment of new combinations in the economy. In this regard, the entrepreneur is a political agent because he is enmeshed in power struggles in extra-economic arenas of society seeking to guarantee an advantaged innovative position for his firm vis-à-vis his competitors (e.g. competitive firms and sectors looking for leverage to influence extra-economic institutions to draw resources for their innovative endeavors). Basically, in his journey to recombine factors of production into new channels, the entrepreneur is connected to a sequence of bureaucratic “orders” (e.g. the state and its bureaucracy, the political class, political institutions, the financial agencies of the state, sub-national governments and

their bureaucracies, the public and private financial system, so on and so forth).

With respect to this “double-faced” function of entrepreneurs, Cardoso says: “(...) the modern entrepreneur executes, in a two-pronged way, the function of innovating to make profits. [He] keeps (...) the necessary *élan* to be ahead of his competitors, when they exist. But, more importantly, he creates conditions to *influence* the economic policy seeking to guarantee the capitalist prosperity in general as well as the highest share of governmental contracts and privileges to [the benefit] of his organization (...) The contemporary capitalism exists through the set of entrepreneurs who are able to innovate in order to make profits in light of market and social conditions. In order to make growing profits – and this is paramount in the *system* – it is necessary to make decisions in face of changing alternatives that affect the system as a whole and, then, to bring innovations into light” (Cardoso, 1972, p. 45).

To conclude, a conceptually rich comparison between Fernando Henrique Cardoso and Joseph A. Schumpeter on entrepreneurship does not entail two mutually exclusive approaches to the phenomenon of entrepreneurial behavior. Although Cardoso (1972) wrote one of the most compelling academic pieces on the sociology of entrepreneurship in Brazil, which has long been ignored for academic and political reasons, his analytical construction on entrepreneurs as political actors is disconnected from his later academic production on the sociology of development.

At any rate, Cardoso (1972) did not illustrate the social mechanisms through which an innovation takes place in the economic arena as a result of new combinations in non-economic spaces of society. In the subsequent chapters of his seminal book on entrepreneurship, Cardoso resorts to a *Weberian*

conceptual framework to analyze the attitudes as well as the mentality of the Brazilian businessman in light of a capitalist economy which was advancing apace during the *developmentalist* period in the country¹⁶.

3. Entrepreneurship, Politics, and Regional Development in São Paulo: a historical example of economic entrepreneurship as politics

In the Brazilian case, one of the most striking examples of the association of class interests with the organization of the state is the series of “innovations” in the coffee production during the 19th Century that, on the one hand, paved the way for the adoption of modern capitalist practices of production in São Paulo and, on the other hand, consolidated the economic and political dominance of the coffee producers in the state of São Paulo from 1890 to 1930 (Fernandes, 1968; Furtado, 1977; Cardoso, 1969; Cardoso, 1972; Reis, 1980; Costa, 1989).

These two historical movements were the main conduits for the industrial surge experienced by the state of São Paulo in the 20th Century, which consolidated the city of São Paulo as well as the Metropolitan Region of São Paulo (MRSP) as the epicenters of manufacturing production in Brazil during the 20th Century (see, e.g. Cano, 1981; Negri, 1996).

¹⁶ I cannot fully explore Cardoso’s arguments on the Brazilian industrial mentality because it is beyond the scope of this chapter. In very basic terms, it suffices to say that Cardoso (1972) explored the contradictions involved in managerial practices that resembled the traditional social attitudes of Brazilian businessmen towards their economic endeavors – e.g. many firms were managed by members of the family network, even though these managers did not have any formal training in management and adopted managerial strategies totally incompatible with rational attitudes towards business practices. As a consequence, many of those firms treated their employees as an extension of the family circuit of relationships, based on traditional social actions, as well as adopted investment practices which were incompatible with the growing rationalization of managerial practices and the development of more advanced (rational) capitalist practices in Brazil brought about by multinational firms (Cardoso 1972: Chapter III, Chapter IV and Chapter V). Finally, it is important to underscore the fact that Cardoso’s notion of the entrepreneur as a political actor fades away as his book proceeds. For one, Cardoso did not adopt the entrepreneur, but the businessman, as a social type when he analyzes the modernization of the Brazilian economy during the 20th Century. Hence, the relationship between entrepreneurial behavior, innovation and political action was neither fully conceptualized nor was it empirically explored in the course of his sociological work on development (Cardoso, 1972; Cardoso, 1969; Cardoso, 1966; Cardoso, 1965). More recent academic works delving into the relationship between businessmen and politics in Brazil take the “Cardoso-Weberian” legacy rather than the “Cardoso-Schumpeterian” legacy as a conceptual reference (e.g. Mancuso, 2004; Mancuso, 2007).

In his seminal contributions to the sociology of entrepreneurship, which are alternative theoretical lenses to widespread Schumpeterian approaches, Cardoso (1972) analyses entrepreneurs as political actors who are forged not only by their special talent to combine factors of production into new products and production processes (Schumpeter, 1934; Schumpeter, 1942) but also by their specific capacity to carve out innovation opportunities through their engagement in variegated social alliances with the state and other actors beyond the scope of the firm (see also Cardoso, 1969; Cardoso, 1966).

Consequently, Cardoso's definition of entrepreneurship assumes a broader social scope compared to the classic conceptualization of entrepreneurship incarnated in Schumpeter's main works (see Schumpeter, 1934; Schumpeter, 1942). Innovation, following Cardoso (1972), is the capacity of economic actors to bring about new products, new processes as well as the creation of new markets through the re-combination of classic factors of production, on the one hand, and the creation and exploitation of social opportunities that maximize the pursuit of entrepreneurial profits, on the other hand.

An entrepreneur might exploit these social opportunities, for instance, by exerting influence on state agencies and national development banks in order to get subsidized credit as well as by engaging in the political arena to push for favorable regulatory and macroeconomic agendas (Cardoso, 1972).

Furthermore, Cardoso (1972) points out that the relationship between entrepreneurs and social actors external to the firm are frequently based on traditionalist personal ties (e.g., friendship and kinship relations) as well as on privileges obtained by the adoption of corrupt practices as a means of extracting benefits from state bureaucracy and the political class.

A good example of that relationship might well be the so-called *Old Republic* in Brazil (1889-1930), in which the most powerful coffee exporters managed to use the state apparatus as an instrument of advancing their own economic interests – for instance, the exchange rates were always adjusted to promote favorable prices for the coffee in the international market and the state bought large quantities of coffee to protect some “privileged” producers from price fluctuations (Furtado, 1977; Topik, 1987; Villela & Suzigan, 1973).

Although an economic sociology of business groups and corruption might be seen as novelty in Economic Sociology nowadays (cf. Granovetter, 2005; cf. Granovetter, 2007), it was still an agenda pursued by the incipient Brazilian Sociology in the 1960s (see e.g. Fernandes, 1968; Cardoso, 1972; Fernandes, Cardoso, & Ianni, 1976).

In line with Cardoso’s perspective, I argue that the entrepreneur is not a demiurge who creates and exploits new products, new industrial processes and new markets isolated from the broader social contexts in which he or she acts (see Cardoso, 1969; Cardoso, 1972). The entrepreneurial function, i.e., the creation and exploitation of new possibilities for the production of new goods and services (Schumpeter, 1934; Schumpeter, 1942), involves not only factors inside the organizational unit of the firm or the creation of a new organization but also the mobilization of *political opportunities* for innovation. Accordingly, the entrepreneur, be it an individual or an organization, is inserted into power struggles that might impede or facilitate the way to innovation. For instance, Cardoso (1969; 1972) argues that industrial elites in Brazil partook in the political arena in order to reap state benefits materialized in subsidies (e.g. state credit and tax cuts for the import of new industrial equipment), fiscal advantages, and protectionist measures undertaken at the national and sub-national levels (see also Reis, 1980; Topik, 1987).

Moreover, industrial development in São Paulo was made possible by the emergence of an *entrepreneurial class*, whose germinal social orientation to more rational capitalist practices of production, paved the way for the Brazilian heavy industrialization in the 20th Century. Along those lines, entrepreneurship in Brazil is a very special amalgamation of social interests, because of which entrepreneurial functions came into light as a *class project* with deep spatial impacts on the patterns of industrialization and regional formation in São Paulo.

This idea seems to be complex but it is rather very simple. Entrepreneurship, in that context, is a class project in that the coffee exporters of São Paulo, also known as “coffee barons”, adopted more rational practices of management in their farms by favoring the deployment of migrant labor into coffee production as well as by creating a specialized coffee farm in opposition to the “old autarchic farms” that used to produce all their staples based on exploitation of slave labor (for a brilliant description of the autarchic farm, see Freyre, 2001).

The social effects of that “new economic mentality” were the creation of incipient markets for labor and subsistence products as well as a light industrial sector to serve the latter (Cardoso, 1965; Cardoso, 1969; Furtado, 1977). The industrial sector emerged in São Paulo as a result of a mentality oriented towards diversification of profits that marked the “new spirit” of the coffee exporters in São Paulo (Dean, 1969; Cardoso, 1965).

As Reis (1985, pp. 194-95) highlights, the efforts of state-building in Brazil are permeated by the interests of coffee exporters who “politicized the economy” thereby using the state as an instrument of their own economic interests – e.g. the immigration policy in São Paulo was a state project instead of a initiative of isolated groups of entrepreneurs (Holloway, 1980).

On the one hand, the vicissitudes of class interests along the twentieth century engendered a socio-economic space oriented to the reproduction of capital based on manufacturing production. On the other hand, entrepreneurship might be inherently spatial; for instance, it was the *spatial situation* of the industrial elites in São Paulo that created a unique socio-economic environment for the adoption of more advanced capitalist practices in Brazil. This process paved the way for subsequent social schemas of capital accumulation based on heavier industries and then the *developmentalist* mode of industrialization implemented from mid-fifties until the crisis of early eighties (e.g. Carneiro, 2002; Evans, 1979; Baer, 1979). *Entrepreneurship has a spatial dimension* – a dimension that, *in itself*, is beyond pure economic factors.

Summing up, space itself is an element in the recombination endeavors that lead capitalism to new productive channels, as I will show in the next chapter.

Moreover, the recent patterns of industrialization in São Paulo are not disconnected from the socio-economic history briefly described above in such a way that the schemas of spatial entrepreneurship currently taking place in the state of São Paulo are built under the ashes of the “old” social mechanisms of capital accumulation.

An exclusive Schumpeterian perspective that disconnects the entrepreneur as well as economic change from the political arena is not applicable to the Brazilian reality. The creation of a rational capitalism in São Paulo was only made possible by a deep political engagement of the coffee exporters (Cardoso, 1965; Cardoso, 1969; Reis, 1985). Summing up, it can be argued that the emergence of a “new industrial elite” in São Paulo, composed by coffee exporters who transferred their profits to manufacturing accumulation as well as immigrants who managed to start up their own small shops in the city, engendered strong historical economies of agglomeration in the

manufacturing sector which are path-dependent in nature, since they were later reproduced by the interests of the industrial entrepreneurs in São Paulo in the 20th Century so as to reinforce the deeply rooted knowledge advantages of the region over time (Fernandes, Cardoso, & Ianni, 1976; Cardoso, 1965; Cardoso, 1969; Storper, 1991).

These historical backdrops of the manufacturing sector in the state of São Paulo are still imprinted in the socio-economic arrangements of the metropolitan region today, thereby influencing the reorganization of the region towards more knowledge-intensive manufacturing (Diniz & Campolina, 2007).

One of the most striking flaws of contemporary approaches to socio-economic development in São Paulo is that the historical roots of the city and the metropolis, which are the backbones of its entrepreneurial and innovative atmosphere, are solemnly absent in the analysis. Regional economies are stocks of relational assets (Storper, 1997); as a consequence, these historical and social elements in the formation of the Metropolitan Region of São Paulo (MRSP) cannot be ignored.

4. Concluding remarks

The main endeavor of this chapter was to unveil the concept of entrepreneurship from a double-pronged perspective. On the one hand, the approach of this paper was consentaneous with the Schumpeterian analytical tradition that sees entrepreneurship as the materialization of new combinations in the economic sphere (e.g. Schumpeter, 1934). On the other hand, as I have shown, the entrepreneurial function – the pushing through of new combinations in the economy leading to new ways of organizing the productive circuit spanning from production to profit – is enmeshed, in some

historical cases, in extra-economic arenas of society. In the industrialization of São Paulo, economic change was organized in the political sphere as prominent coffee planters of São Paulo captured the bureaucratic structure of the state in order to expand the dynamics of capitalist accumulation. In so doing, they reorganized the territorial patterns of capitalism in São Paulo by expanding the areas for coffee cultivation, which provided planters with capital surpluses directed to other areas of the economy – including manufacturing (Cano, 1981; Mello, [1975]2009).

As I will try to demonstrate in the subsequent chapters of this dissertation, Schumpeter's conceptual tools on entrepreneurship and innovation lie at the core of the empirical tenets that guide the potential accomplishments of this research. Basically, one of my future objectives is to integrate entrepreneurial behavior to technological development at the micro and meso-levels (the micro-regions and the state of São Paulo, respectively). In so doing, I will seek to link entrepreneurial behavior to empirical data on innovative efforts of firms – e.g. regional patterns of Research and Development (R&D) investments in the state of São Paulo.

Although entrepreneurship as an extra-economic combination of resources influences the innovative outputs of firms, which brings Cardoso's theoretical perspectives into the scene, it is only possible to capture those outcomes by resorting to datasets on R&D investments – assuming that R&D activities are an approximation of reality as to how intense are the efforts of economic agents oriented towards recombining factors of production into new products and industrial organizations.

Furthermore, as I have synoptically unveiled, the foundation of the state of São Paulo as an industrial center has to do with institutional aspects of entrepreneurship which have been commonly ignored by the literature on

entrepreneurship in Brazil. For instance, the advent of the specialized coffee farm as well as the macro-economic and infra-structural policies that paved the way for higher levels of capital accumulation in São Paulo have never been treated as an entrepreneurial class project by the Brazilian literature on development (cf. Furtado, 1977).

As Hwang & Powell (2005) cogently argue, not only does entrepreneurship entail the recognition of social opportunities that lead to emergence of new combinations in the economic field but also movements of recombination of institutional factors in such a way that entrepreneurial leaders can “enmesh” their actions in a favorable and legitimate political and social context – e.g. in São Paulo, with the growth of the coffee regions in the West, the coffee producers in the state pushed for an institutionalized immigration policy oriented to bringing “new arms” for the expanding economy based on the export of coffee (Costa, 1989; Holloway, 1980).

Certainly, those innovative outcomes partially emerged as a consequence of innovative resources mobilized in extra-economic spheres of society (Cardoso, 1972). In that sense, entrepreneurial behavior understood beyond the economic realm is also paramount to a more realistic comprehension of the consolidation of firms in São Paulo as the most innovative in the country.

One of the main goals of this research, particularly in the next chapter, is to reconstruct the entrepreneurial origins of the state of São Paulo from 1880s to 1930. Such a reconstruction seeks to place the regions in the state as historically rooted stocks of social relations that reverberate in economic change as well as in technological development in historical perspective.

By pursuing this approach not only do I intend to go beyond the socially neutral character of innovation in economic textbooks (cf. Ruttan, 2002) but I am also in search of an alternative analytical perspective to the cold blueprints

of physical planning and theories of industrial location devoid of any concern with power and social relations in the consolidation of economies of agglomeration.

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CHAPTER 2

ENTREPRENEURSHIP, POLITICS, SPACE: THE SOCIAL ROOTS OF THE INDUSTRIALIZATION OF SÃO PAULO (1880-1930)

Introducing the argument: entrepreneurship, politics, and space

The utmost goal of this chapter is to scrutinize the entrepreneurial roots of manufacturing development in the state of São Paulo. For that endeavor, I will embark upon a historical reconstruction of the roots of industrial concentration in the state. Thus, I will argue that it is imperative to understand the patterns of elite mobilization that created the conditions for the advent of the modern capitalism in Brazil. Moreover, I will seek to portray the social organization of the economy *beyond* the entrepreneurial role of coffee planters in São Paulo. The central role of coffee planters as entrepreneurs notwithstanding (e.g. Dean, 1969; Reis, 1980; Costa, 1989), it is pertinent to recognize as well as analyze the waves of Schumpeterian entrepreneurship that came to the fore as a result of a capitalist mentality brought by European immigrants – particularly before the outburst of the World War I in Europe between 1914 and 1918 (Dean, 1969; Simonsen, 1939; Cardoso, 1969).

Accordingly, the basic argument that will pervade this paper is the following: not only are the social foundations of the industrialization of São Paulo rooted in a two-pronged form of entrepreneurship (economic and political); these foundations are also entrenched in a spatial form of entrepreneurship – i.e. the organization of the socio-economic space, in São Paulo, emerges as a product of a sequence of entrepreneurial actions undertaken by the economic and political elites in São Paulo during the heyday of coffee exports in the

Western region of the state of São Paulo between 1880s and 1930¹⁷. Because space itself is a historical outcome of social relations (Lefebvre, [1970]2009; see also Massey, 1992; Healey, 2007; Martin & Sunley, 1997), the daily struggle of individuals to accomplish their material and ideal interests might produce new forms of economic accumulation in spatial context¹⁸.

As a consequence of this approach, *two major epistemological challenges* come to the fore. On the one hand, *entrepreneurship* must be understood in a broader sense than is commonly done; such a broader definition encompasses recombinant endeavors not only in the realm of economy but also innovative changes (new combinations) in extra-economic arenas of society pursued by social actors seeking to accomplish their interests in the economic sphere (e.g. Martins, 1967; Cardoso, 1972). On the other hand, *the notion of space* needs to

¹⁷ Although the integration of the state of São Paulo into the international coffee market had taken place much earlier in the Paraíba Valley, it is the expansion of the coffee plantations in the much more productive lands of the “*Paulista West*” that gave political and economic prominence to the planters of the state. As Stein ([1958]1985, p. 53) shows, the earliest information on coffee exports, via the Port of Rio de Janeiro, traces back to 1792, when 160 arrobas were exported; the first coffee boom in Brazil took place between 1835 and 1845-46 – during this decade, the exports of coffee raised from 3,237,190 to 6,720,221 arrobas. The slave-based plantations of the Paraíba Valley in São Paulo were integrated to the coffee market in the state of Rio de Janeiro – in the region known as “*Vassouras*” (Stein, [1958]1985; see also Cano, 1981). Not until the mid-1880s had the Western regions of São Paulo surpassed the Paraíba Valley as the main export coffee complex in Brazil – as I will show, the implementation of the British São Paulo Railway Company, which started linking the Port of Santos to the cities of São Paulo and Jundiaí in 1867, was the epicenter of the development of the Western region of São Paulo (Matos, 1973; Milliet, 1941).

¹⁸ The connection between interests, entrepreneurship, and economic development is central in this paper. Entrepreneurship – the pushing through of new combinations in the economy (Schumpeter, [1911]2003; Schumpeter, 1934; Swedberg, 2009) - will assume an interpretive conceptual form (i.e. the subjective meaning attached to economic social actions pushed through by the economic and political elites is the main *explanatory cause* of industrialization in São Paulo). Despite the fact that the accomplishment of interests in the political arena is a *sine-qua-non* condition for the emergence of new combinations in the economic field in São Paulo, I will conceptually assume, as Max Weber does, that the market situation of individuals provides the basis for their actions as economic agents. In so doing, I will follow Weber with respect to considering the prevalence of economic interests as a basis for class action – carried out from the point of view of the market situation of economic agents. As Weber (1958, p. 181) points out, “(...) We may speak of a ‘class’ when (1) a number of people have in common a specific causal component of their life chances, in so far as (2) this component is represented exclusively by economic interests in the possession of goods and opportunities for income, and (3) is represented under the conditions of the commodities or labor markets”. As we will see over the course of this paper, the case of São Paulo is special because there was a coincidence, during the First Republic (1889-1930), between the *market situation* of economic agents and their *spatial situation* – as the coffee planters of São Paulo pursued their interests in the economic arena, not only did they promote changes in the political arena but they also transformed the spatial configuration of the economy in São Paulo - which, in turn, paved the way for industrialization to materialize.

be understood from a historically dynamic point of view. In this sense, space cannot be envisioned only as a static or physical realm of social relations – what Henri Lefebvre ([1970]2009, p. 169) would call “container”, but also as an arena where the social production of life is engendered by the interests of individuals and social groups. As Healey (2007, p. 14) points out, space is a “strategic site” where meaning is constructed through distinctive perspectives and social positions; since space is a source of multiple social meanings, the consequent diversity of interests that it entails necessarily leads to conflicts over the control of symbolic and material resources in spatial context (see also Lefebvre, 1991; Lefebvre, [1970]2009).

In order to capture the entrepreneurial roots of industrialization in São Paulo, not only is it imperative to politicize the economy but it is also necessary to treat space as a source of political opportunities and conflicts in light of the structural position of individuals and groups, as Lefebvre cogently does (see Lefebvre, [1970]2009; Lefebvre, 1991).

To deal with the first epistemological challenge, entrepreneurship - as a complement to the traditional Schumpeterian definition - will be defined as a broader social endeavor *beyond* the realm of the attainment of new combinations in the economic sphere that spans from production to profit; in other words, the recombination of already existing material means in the economy oriented to producing new and profitable combinations (Schumpeter, 1934; see also Swedberg, 2009). The main epistemological challenge of the Schumpeterian tradition is that its notion of economic entrepreneurship – defined as the successful introduction of new combinations in the economic sphere – does not leave room for recombinant *economic* arrangements that take place in *extra-economic* spheres of society, such

as the political arena (Cardoso, 1972; Fernandes, Cardoso, & Ianni, 1976)¹⁹. Entrepreneurship in Brazil does not always take a classical Schumpeterian form; for instance, the capitalist class of coffee planters in São Paulo “captured” the political institutions of the country as well as the state government in order to make their economic interests prevail²⁰; this lies at the core of a sequence of economic innovations pushed through in São Paulo: the expansion of the railroads, the creation of a financial system, and the implementation of a subsidized immigration enterprise to provide planters

¹⁹ It is imperative to say, at this point, that my approach to entrepreneurship - as seen in the First chapter of this dissertation, does not seek to reject the Schumpeterian perspective (Schumpeter, [1911]2003; Schumpeter, 1934). I will keep the Schumpeterian conceptual scheme, albeit stretching it to extra-economic spheres of society where new combinations might be orchestrated by economic agents oriented to accomplish their interests. In doing so, I am taking an alternative explanatory route to industrialization vis-à-vis the most acclaimed theoretical perspectives on industrial development in São Paulo. The most important studies on the connection between the coffee economy and industrialization resort to the classic Marxist arguments on capitalist transition to explain the industrial development in São Paulo (Martins J. d., 1979; Cardoso, 1969); these theses are sometimes inspired by French Marxist Charles Bettelheim (e.g. Silva, 1985; Mello, [1975]2009). Under this analytical perspective, industrialization emerges as a consequence of the growing contradictions between the productive forces and the relations of production – i.e. the subordination of labor to capital as a source of surplus. Therefore, the emergence of an incipient industrial structure in Brazil is generally seen as a *natural* stage of capitalist development, rather than being analyzed as a consequence of individual actions and interests of capitalist entrepreneurs – as coffee planters and immigrants in São Paulo. Not coincidentally, the Schumpeterian theoretical framework is explicitly rejected by those authors, who offered seminal perspectives on the industrialization of São Paulo. Along these lines, Mello ([1975]2009, p. 77) argues that “(...) it is necessary that [some economic agents] foresee the demand, especially when it comes to the capital goods industry, which presupposes the active role of the state (since we cannot believe in Schumpeterian entrepreneurs)”. José de Souza Martins (1979, p. 107), in his turn, says that the industrialization of São Paulo is not result of “[Schumpeterian] entrepreneurial abilities” but consequence of the formation of a bourgeois consciousness – through which the coffee planters could take advantage of capitalist relations of production. These two arguments partially miss the mark because they reduce human ingenuity to a historic determinism that does not explain the complexity of social relations. As I will try to demonstrate, the industrialization of São Paulo is engendered through a very specific form of interplay between economic interests and the configuration and the recombination of the economic space. From my perspective, the richness of the creative capacity of human beings is more enlighteningly captured under the lenses of the methodological individualism brought into light by Weber and Schumpeter (Weber, 1958; Weber, 1978; Schumpeter, 1934; see also Swedberg, 1998, pp. 213-14; Swedberg, 2009).

²⁰ The idea that interest groups capture regulatory institutions in order to protect their interests in the economic arena was seminally developed by Nobel Prize economist George Stigler (see e.g. Stigler, [1971]1986; Leube & Moore (eds.), 1986). According to Stigler ([1971]1986), firms and interest groups engage in the political arena – e.g. by financing political candidates as well as parties – seeking to acquire a regulatory structure that attends the interests of the specific economic groups in the market. One of the most interesting points of Stigler’s arguments on regulation is that a friendly regulatory scheme is an asset for firms and is acquired in the same way as goods in the market: industries invest in a certain party expecting that this party will use the coercive power of the state to implement a regulatory framework that either limits competition in benefited industries or transfers resources from the state in the form of subsidies to guarantee the profitability of privileged firms or sectors (Stigler, [1971]1986, pp. 245-46).

with a secure source of free labor (Reis, 1980; Silva, 1985; Font, 1990; Kohli, 2004; Furtado, 1977; Villela & Suzigan, 1973; Cano, 1981; Dean, 1969; Graham, 1973; Holloway, 1980).

The “politicization of the economy”, as Reis (1980, p. 165) terms it, was carried out through a series of policy innovations which, in turn, paved the way for those new enterprises to come into light during the years of the First Republic in Brazil (1889-1930). As I will show, the class of coffee planters in São Paulo benefited from an extremely lenient fiscal policy which did not tax either land or income. The main foundation of state financial resources was an import tariff, mainly levied on manufacturing goods, which worked as an indirect industrial policy because it created a protective mechanism for national industries (Topik, 1987; Luz, 1975; Villela & Suzigan, 1973; Cano, 1981). Furthermore, the state generally devised policies oriented to protecting the income of planters either by devaluating the national currency (the *Milréis*) when the prices of coffee fell in the international market or by engaging in direct interventions in the market. During the First Republic – through its policies of permanent defense of coffee, which took place after 1906 - the state government, mainly financed by North American exporters and British bankers, bought enormous quantities of coffee bags from the planters in São Paulo in order to constrict the supply of coffee in the international market, thereby maintaining the prices of the product at opportune levels for planters (Villela & Suzigan, 1973; Furtado, 1977).

Having their incomes protected by the state, the planters of São Paulo could diversify their investments by channeling their capital to other economic areas - such as the financial sector, commercial activities, the railroads and manufacturing. In many cases, planters established partnerships among

themselves to invest in those activities (Cano, 1981; Hanley, 2004; Dean, 1969; Silva, 1985; Mello, [1975]2009; Matos, 1973).

To tackle the second epistemological challenge, I will conceptually treat *space* as mosaic of social practices. I will thus unveil the social production of life as an amalgamation of material and ideal interests that cannot take place without a (socially and historically produced) spatial context (Lefebvre, 1991). As will be clear over the course of this paper, the notion of space as a sheer container of a-politicized as well as neutral social relations and physical properties will be rejected on the grounds that it fails to portray the spatial organization of society as a historical tapestry of social practices (for a similar argument, see Lefebvre, [1970]2009; Lefebvre, 1991). Since the spatial configuration of society is engendered by material and ideal interests, as well as conflicts between social groups over the control of resources, space is a “historical product” - as Lefebvre ([1970]2009, p. 171) highlights, but also producer of history inasmuch as the spatial organization of capitalism evolves in the wake of its contradictions (Harvey, 2006); thus society is spatially constructed insofar as the spatial interaction of individuals and social groups has an impact on social action, thereby affecting the way “society works” (Massey, 1992, p. 70; Lefebvre, 1991; Goldsmith, 2002). Seen from this analytical angle, the industrialization of São Paulo is not only a class project but also a spatial endeavor undertaken by economic agents engaged in the accomplishment of their interests. The continuous emergence of manufacturing, during the First Republic in São Paulo, came into light as outcomes of social actions and social relations that shaped the space of reproduction of capitalism in the state. Entrepreneurship, from this spatial perspective, involves recombinant endeavors - undertaken by entrepreneurial leaders - that transform as well as expand the geography of capital accumulation. As I will show, the pioneer

movement in the state of São Paulo, which opened up new spaces for coffee cultivation in the most productive lands of the state, was one of the main sources of opportunities for profit in the newborn capitalist economy of São Paulo (Monbeig, [1952]1984). The geographical organization of capitalist accumulation was, therefore, conducted to new channels in the wake of the expansion of the circuit of capitalist accumulation boosted by the coffee economy. The expansion of railroads laid out on the abundance of coffee trees that carved out the socio-economic landscape of São Paulo; the patterns of land occupation; the violent expansion of arable lands for coffee cultivation (which oftentimes involved the slaughtering of indigenous populations in remote territories in São Paulo), and the creation of an immigration enterprise (Monbeig, [1952]1984; Matos, 1973; Holloway, 1980; Milliet, 1941; Cano, 1981). All of these are compelling examples that pave the way for an analytical perspective that relate the production of space to an amalgamation of material and ideal interests in the economic sphere.

Summing up, the industrialization of São Paulo will be seen not only as a *class* project undertaken by the entrepreneurial coffee elites and immigrants but also as a *spatial* venture carried out by the economic agents pursuing the accomplishment of their interests. It is therefore impossible to understand the industrialization of São Paulo without taking into account the relationship between economic interests – which are intertwined with political interests as well – and the ensuing spatial configuration of the economy. The way space was recombined during the coffee economy in the state helps to unveil the prominence of São Paulo as one of the most powerful regional economies in Latin America nowadays.

2. Entrepreneurship, Politics, Space: the articulation of economic change with non-economic social arrangements (or the “social-economics” of entrepreneurship)

The main goal of this section is to explore the connections between economic change in São Paulo and extra-economic arenas of society – with a special focus on the accomplishment of economic interests in the political sphere. On the one hand, I will argue that the social roots of the industrialization of São Paulo are engendered as an entrepreneurial project, a qualitative recombination of economic and political forces, led by the most prominent coffee planters of São Paulo. On the other hand, I will disentangle the spatial impacts of such an entrepreneurial project: in order to accomplish their interests in the economic arena, powerful coffee planters in São Paulo promoted an intense reorganization of the geographical arrangement of capitalist accumulation in the state. The pioneer front, as Monbeig ([1952]1984) terms it, not only expanded the arable lands for coffee cultivation but also broadened the capitalist space in São Paulo by offering new opportunities for profit-making – e.g. heavy investments in railroad development in the dawn of the twentieth century were organized by networks of coffee planters seeking to connect the most productive lands of Western São Paulo to the Port of Santos (the main export hub for coffee production) (Matos, 1973; Monbeig, [1952]1984). In this sense, the diversification of investments leading to manufacturing development came to the fore in the wake of a spatial recombination of capitalism in São Paulo.

2.1. Entrepreneurship as Politics: the coffee economy and the industrialization of São Paulo (1880-1930)

As I have argued, one of the main epistemological challenges imposed by the analysis of entrepreneurial change in the industrialization of São Paulo is

to understand how the elites in the state accomplish their economic interests by promoting change in extra-economic spheres of society. In other words, the connection between entrepreneurship and the *genesis* of industrialization in São Paulo can be more bountifully grasped if entrepreneurship is understood as a wide-ranging social endeavor.

First and foremost, then, entrepreneurship should be envisioned here as a comprehensive endeavor that involves new combinations in the *economy as a whole*, following the seminal ideas of Schumpeter (1934). Accordingly, Schumpeter makes the case for “economic” and “technological” combinations that promote transformations in the economic realm (Schumpeter 1934, pp. 14-15). As Schumpeter (1934, p. 14) points out, “*technologically* as well as *economically* considered, to produce means to combine the forces and things within our reach. Every method of production signifies some such definite combination (...) every concrete act of production embodies for us, is for us, such a combination. This concept may be extended even to transportation and so forth, in short to everything that is *production in the widest sense*” [emphasis added] (see also Swedberg, 2009, p. 86).

Consentaneously with this point of view, Schumpeter ([1911]2002) argues that entrepreneurship might be defined as the pushing through of new combinations that do not necessarily lead to the craft of new goods in the economy. As a corollary of this argument, new combinations in the economy might be oriented to *new ways of producing* already known goods – even if these goods, *per se*, do not embody any sort of technological innovation in its final form. As Schumpeter ([1911]2002, p. 410) avers, “(...) of course, the introduction of a new quality of good, or a *new use of an already known good*, are on the same level. But also a *new production method for one of the goods hitherto produced* should be understood as ‘a new combination’, which is easily seen

when taking into account that this leads to a *Virement* of productive forces and values. The same is true of the opening up of a new market, which is self-evident, and finally it is also unproblematic to recognize the same principle in the change of economic organization, e.g., in founding a trust, establishing a large corporation, etc” [emphasis added].

Accordingly, entrepreneurship, from the point view of the young Schumpeter ([1911]2002; [1911]2003) is a broad social enterprise which lies beyond the realm of technological recombinant endeavors: entrepreneurship, here defined, is a *qualitative reorganization of the productive forces, via recombinant efforts, leading to a new productive circuit* – which involves new social relations in the spheres of production, exchange, and profit-making through market-oriented interactions, regardless of the technological stage of the goods involved in the productive circuit.

Although the Schumpeterian concept of entrepreneurship has been more often applied to the study of technological innovation (e.g. cf. Scherer, 1984; cf. Acs, 2009; cf. Ruttan, 2001; cf. Olsson & Frey, 2002), the industrialization of São Paulo – which takes form as a consequence of new combinations in the economy carried out by the economic elites in the state – is more richly comprehended if entrepreneurship is understood as an amalgamation of broad recombinant efforts undertaken by economic agents oriented towards igniting change in the whole profit-seeking economic circuit, which spans from production to distribution and exchange (Polanyi, 1957; see also Swedberg, 2005).

The new combinations that engendered the seminal manufacturing sector in São Paulo were not carried out with the explicit purpose of promoting technological innovations – despite the fact some important technological advances were introduced to augment the productivity of the coffee economy

(Dean, 1969; Cano, 1981). Hence, rather than being a product of continuous technological innovations, the industrialization of São Paulo came to the fore as a consequence of opportunities of investment generated by the export dynamics of the coffee economy; moreover, the economic policies implemented during the First Republic – e.g. the manipulation of the exchange rates according to the price of the coffee in the international market as well as the absorption of the surplus financed by the government - stimulated the expansion of coffee production above the levels of demand by the world market (Delfim Netto, 1973; see also Silva, 1985; Mello, [1975]2009).

What is distinctive about these opportunities, to sum up, is the fact that they lie at the crossroads between the economy and the political field. For one thing, the state apparatus was decisively oriented to securing the land income in the hands of the coffee planters (Reis, 1980); furthermore, the state engaged in constant interventions in the price of coffee in the export markets (Topik, 1987; Font, 1990; Villela & Suzigan, 1973; Furtado, 1977).

Not only were those decisive opportunities for manufacturing creation exploited in the realm of the economy as a whole, in the Schumpeterian fashion, but they were also bred by the constellation of interests in the political field – the political engagement of the class of coffee producers engendered a state of affairs in which the surplus of the exported-oriented economy could be channeled to economic activities outside the traditional agricultural activities (such as the financial sector, the commercial sector, the transportation sector, and the manufacturing) (see Cano, 1981; Silva, 1985; Mello, [1975]2009).

Accordingly, economic change emerges not only by *endogenous* recombination of factors, necessarily carried out *within* the economy and

pushed through by entrepreneurial leaders, as Schumpeter avers (see Schumpeter, [1911]2003; see also Schumpeter, 1934; Swedberg, 2009); economic change is also engendered in the struggle for political power that paves the way for economic policies oriented towards concentrating the social surplus created by the whole economy in the hands of privileged economic actors who are politically influential. In other words, innovations in the economic realm might also be partially organized *inside* the political sphere in such a way that the constellations of interests in politics, in contrast with Schumpeter's arguments, might be directly related to new forms of organizing the economy.

The interdependence between the coffee economy and the industrialization of São Paulo compellingly illustrates the exploitation of entrepreneurial opportunities through privileged political relationships among the elites (see Prado Jr., 1962; see also Costa, 1989).

Consequently, innovation, in the economy as a whole, might emerge as a result of transformations in the political realm led by individuals and social groups seeking to accomplish their economic as well as extra-economic interests. The economy might not only *adapt* to external impulses coming from the constellations of interests in politics but it might also *qualitatively change* (i.e. develop) as a result of struggles for power in the political field²¹.

²¹ One of the main points in Schumpeter's theory of entrepreneurship [development] rests upon the distinction he makes between *adaptation* (statics) and *qualitative change* (development) *within* the economic sphere (Schumpeter, [1911]2002; Schumpeter, [1911]2003; see also Shionoya, 1990). For Schumpeter ([1911]2002; [1911]2003), the *qualitative* changes that lead the economy to new forms of organization are brought about *within the economy* by entrepreneurial leaders who are able to recombine existing factors of production in order to produce new goods or produce existent goods in a new way; opportunities for entrepreneurship might emerge as a result of changes in non-economic spheres of society, though they are *never organized* outside the economy. As a corollary of this perspective, Schumpeter ([1911]2002; [1911]2003) avers that changes in non-economic spheres of society do not conduct the capitalist circuit of accumulation to qualitatively new directions. In other words, transformations in extra-economic spheres of society may have a quantitative impact on the economy, which Schumpeter ([1911]2002, p. 406) terms "changes in the natural data" – e.g. as the population and income levels grow, the equilibrium levels of the economy follow suit since the agents in the [static] economy will socially respond to such changes by altering the *quantitative*

This picture is very clear in the industrialization of São Paulo: what Cano (1981, p. 134) calls the “spill” of resources for investment out of the coffee complex towards “urban segments of the economy” - which expanded the capacity of accumulation of the economy as a whole, came to the fore as a consequence of the political dominance of the ruling economic class over the policy-making threads enmeshed in the state apparatus (see e.g. Sodré, 1964; Reis, 1980; Font 1990; Furtado, 1977; Prado Jr., 1962).

At this point, one might ask: more precisely, how did the political influence of coffee planters in São Paulo open up the avenues of economic change leading to industrialization?

In contrast with the most acclaimed scholarship on the industrialization of Brazil (cf. Cano, 1981; cf. Tavares, [1975]1985; cf. Furtado, 1977; cf. Villela & Suzigan, 1973; cf. Baer, 1979), I aver that the social origins of the industrial leap in São Paulo from 1890s to 1930s were intrinsically related to networks of interpersonal relationships consolidated by family ties as well as status positions of the main coffee planters of São Paulo (Hanley, 2004; Levi, 1987). Thus, the entrepreneurial networks of investments that sustained the growth of sectors complementary to the coffee economy over the course of the First Republic in São Paulo rested on relationships of trust constructed in the

levels of production as well as consumption in the economy as a whole, albeit maintaining the social organization of production at the same *qualitative level*. For Schumpeter ([1911] 2003), economic development – or a qualitative change in the way the economy is organized – can only take place from within the economic sphere: “(...) according to this [static] notion, the economy adjusts [adapts] in a specific way to any given change, be this in the social, geographical, ethnic, or the general cultural environment. The economy changes – according to this view – only insofar as there is a change in the environment itself (...) In other words, there is no true *economic* development, no development emanating from the economy itself (...)” (Schumpeter, [1911] 2003, p. 65) [Schumpeter’s emphasis]. Consequently, wrapping up Schumpeter’s arguments, development is understood as an endogenous movement in the economy which is never propelled from external social spheres: “(...) by development we shall understand only such changes in economic life which are not forced upon it from without, but arise by its own initiative from within (...) [If] the phenomenon we call economic development is in practice simply found upon the fact that the data change and the economy continuously adapts itself to them, *then* we should say that there is no economic development” (Schumpeter, [1911]2002, p. 405) [Schumpeter’s emphasis].

family connections among planters and consolidated in the political sphere of society, particularly so after the emergence of the Republican movement in São Paulo (Love, 1980; Reis, 1980; Hanley, 2004; Dean, 1969). By the time the “Paulista” elites entered the export-oriented coffee market, in the mid-nineteenth century, business enterprises in Brazil were regulated by the Commercial Code of 1850 – an extremely cumbersome set of rules and procedures oriented to controlling the establishment as well as functioning of joint-stock companies and financial institutions (Hanley, 2004, p. 192; Piñeiro, 2007). Under this regulatory framework, also known as “Law of Impediments”, entrepreneurs must be granted a special permission from the Imperial government to open up joint-stock firms (Piñeiro, 2007; Hanley, 2004).

As a consequence, entrepreneurial activity over the course of the Empire was vitally dependent on privileged political connections: entrepreneurs could mobilize their connections in the political structure of the Empire seeking to “speed up” the process of starting up a joint-stock company (Costa, 1989; Prado Jr., 1962). Nonetheless, the emergent class of coffee planters in São Paulo could not rely on the Imperial political structure in order to channel the capital surplus from the thriving coffee production to new economic activities that required special permission from the Imperial Council of State. On the one hand, the new coffee barons of São Paulo were proportionally underrepresented in the Imperial Congress because the province had one of the lowest ratios between congressional seats and population by the end of the Empire (Costa, 1989; Love, 1980). On the other hand, the growing economic relevance of São Paulo in the wake of the export-oriented coffee economy as well as the formidable population growth in the state in the late

nineteenth century were not matched by the number of seats assigned to the state of São Paulo in the Imperial Congress (Casalecchi, 1987; Costa, 1989).

In light of the rapid development of the coffee economy in São Paulo – and consequently the emergence of “Paulista” coffee planters as major economic actors, the contradictions between the economic institutions in Brazil and the emergent forces of capital accumulation became apparent: the regulation of the business sector in the final years of the Empire did not attend the interests of the coffee planters in São Paulo, who pushed for deep economic reforms in order to “liberate” the productive forces of capitalism and to ease the way for entrepreneurs to invest the surpluses of the coffee production in other sectors of the economy (Casalecchi, 1987; Costa, 1989; Love, 1980). Because most coffee planters from São Paulo were excluded from the political structure of the Empire – an inheritance from the colonial period, they could not rely on state patronage to diversify their investments by channeling capital surpluses from the export sector to other areas of the economy. The Republican movement in São Paulo was politically organized to strive for a liberal agenda that reacted against the Imperial intervention in the economy (Love, 1980).

As Costa (1989, p. 177-78) points out, “(...) the [Imperial] government was not only the regulator but also the protector of national and foreign enterprises, authorizing or prohibiting, providing subsidies, granting taxes, guaranteeing interests, establishing priorities, granting tax exemptions. State patronage, or in other words the patronage of politicians, could determine the success or failure of many initiatives. To a significant degree entrepreneurs were at the mercy of politicians. (...) But the system of patronage became more inefficient when business ventures multiplied. Thus it is not surprising that toward the end of the [nineteenth] century there was growing

condemnation of state intervention in the economy – and, by extension, oligarchical power and the institutions that supported it”.

The extreme centralization of the Empire with respect to business regulation stimulated an upsurge in informal networks of investment among the most important planters in São Paulo. In the absence of a consolidated banking system, planters were personally involved in financing the expansion of coffee frontier in the most productive lands of the Western São Paulo – in such a way that family ties were an essential feature of a credit system based on personal trust (Levi, 1987; Stein, [1958]1985).

The Republican movement in São Paulo – agglutinated in the Republican Party of São Paulo [*Partido Republicano Paulista*, henceforth PRP] - reinforced those ties by transferring loyalties among planters to the political sphere (Casalecchi, 1987; Love, 1980). The spirit of association among planters in the political arena paved the way for a pattern of investments in diverse sectors of the economy that became evident over the course of the First Republic (1889-1930): many business ventures, particularly in the manufacturing sector as well as in railroad development, were undertaken by networks of planters who invested in other profitable areas beyond coffee production (Hanley, 2004; Matos, 1973; Dean, 1969; Cano, 1981).

The agglutination of the political elites in São Paulo around common economic interests became evident after the Convention of Itu, in 1873, which marked the first Republican movement in Brazil as well as the foundation of the PRP (Love, 1980; Matos, 1973). The PRP, which came into the limelight as the political backbone of the industrialization of São Paulo, was forged in the most prosperous coffee region of São Paulo at the time: the expanding coffee frontier in the late nineteenth century comprised by the regions of Campinas, Itu and Jundiaí (Casalecchi, 1987; Love 1980). At that

time, the territorial conquest of Western fringes of the state of São Paulo had begun following the traces of the modern Santos-Jundiaí Railway, inaugurated in 1867, as well as by the “Paulista” Railway [*Companhia Paulista de Estradas de Ferro*], incorporated in 1868 (Matos 1973). The “Paulista” was the first railway in São Paulo incorporated by planters; most of these planters were tied to the political as well as economic leadership exerted by the prominent Prado family, who organized the venture (Levi, 1987, p. 84; Matos, 1973; Mattoon Jr., 1977). The “Paulista” Railway linked Jundiaí and Campinas to the Port of Santos from its inauguration in 1872, thereby boosting the territorial occupation in the Western region of São Paulo in the wake of growing coffee exports (Matos, 1973).

As Sodré (1964) aptly observes, the Republican movement in São Paulo was organized in a historical context of deepening contradictions between the institutional arrangement of the Empire and the growing economic importance of the most important landowners in São Paulo. In other words, the extreme political centralization of the Empire as well as the rigorous regulatory control over the economy imposed by the Imperial bureaucracy created a situation of contention among the elites in the last years of the Imperial government (see also Costa, 1989); in this context, the Republican movement in São Paulo sought to disrupt the bureaucratic dominance of the Empire by breaking apart its main seams: the centralized bureaucratic structure which denied the provinces autonomy to deal with their own economic issues (Prado Jr., 1962; Topik, 1987; Costa, 1989; Casalecchi, 1987).

It is important to mention that, in the final years of the Imperial government, sub-national governments could not borrow money in the international financial system (Prado Jr., 1962). Furthermore, the formation of a regionalized financial sector was hampered by the central Imperial

government, which privileged a concentrated financial sector in Rio, thereby imposing cumbersome bureaucratic barriers to the concession of the required charters for operation of banks outside the Imperial capital city. One of the most important sources of funds for the central government over the course of the Empire was obtained through active speculation in the concentrated financial markets (Topik, 1987; see also Hanley, 2004)²².

Moreover, the political structure of the Imperial state was not attendant to the interests of the emerging coffee planters of São Paulo after the economic elites of the state consolidated their participation in the export-led capitalistic circuit (Prado Jr., 1964; Love, 1980).

²² There is compelling evidence that the Imperial government was involved in active financial speculation in the years immediately before the proclamation of the First Republic, in 1889 (Topik, 1987, pp. 28-29). The most rentable financial instrument in the final years of the Empire was the Treasury bond issued by the central government, the most important borrower in the country (Topik, 1987, p. 28). According to the literature on economic development in the end of the Imperial government, the higher return rates to the treasury bonds compared to that yielded by productive forms of investment (manufacturing or agriculture) as well as an extremely conservative and centralized financial system hindered the further development of the capitalism in São Paulo (Hanley, 2004; see also Prado Jr., 1962). As Hanley (2004, p. 198) points out, the financial system limited the opportunities of investment in São Paulo because of the short-term nature of the credit provided, thereby suffocating entrepreneurial ventures which could diversify the circuit of accumulation of the economy as a whole. I have said already that the financial system in São Paulo was organized through networks of personal relationships based on trust (“a good name in the market [praça]”, as the Brazilian expression goes even today). Consequently, a very informal financial system impeded the entrepreneurial ventures to take place insofar as one had either to be personally well connected to mobilize resources for a new enterprise or to go through a very cumbersome procedure to get short-term credit (Hanley, 2004; Levi, 1987; Cano, 1981). Moreover, given the extremely cumbersome rules to get a loan as well as the short-term loans practiced in the formal financial market by the few banks available, entrepreneurial ventures were discouraging and extremely risky. As described by Topik (1987, p. 28), “(...) only seven of the country twenty states had a bank at all, and well over half of all deposits lay in Rio’s vaults. Most loans, consequently, were extended by individuals rather than banking houses and credit was generally short-term. The stock market had been a rather insignificant source for capital”. Not coincidentally, only 636 manufacturing shops founded before the advent of the Republic in 1889 had survived until 1912 - when there were 9,475 manufacturing shops registered by the Industrial Survey of 1912 (IBGE, 1990). Out of those 9,475 manufacturing shops in 1912, 8,732 had been founded after 1890 (IBGE, 1990). According to Stein (1957, pp. 86 and *passim*), the expansion of credit after the proclamation of Republic, in 1889, paved the way for many industrial ventures to come to the fore. Because of the financial reform in the dawn of the Republic, banks were empowered to issue currency, which significantly expanded the supply of money and, as a consequence, the availability of credit for entrepreneurial ventures – many of them associated to speculative bubbles. As Stein (1957, pp. 87-88) describes, the expansion of credit – which became uncontrolled in 1892 – had a positive effect on the formation of new manufacturing firms and acted as one of the main catalysts to the Brazilian early industrial development: “(...) viewed in perspective, however, the boom contained positive elements. Despite the excesses, it symbolized the attempt to break with the slow, routine agricultural past epitomized by the conservative and rejected Empire (...) Democratic industry was a way to modernize and revitalize Brazil. It alone, some Brazilians felt, might bring felicity to the laboring man while augmenting the capital of enterprising investors”.

This context of dissention among the elites, according to Sodré (1964, p. 274), exposed irreconcilable social fissures in the fragile political arrangement of the Empire, which had been splintering apart with the emergence of new economic actors who pushed for more participation in the policy-making arenas of the state: “(...) whereas one of its fractions [mainly, the slave-owner class as well as the commercial classes of Rio] kept anchored in the colonial structure (...) the other [mainly represented by the coffee planters in São Paulo who defended more progressive reforms, such as the immigration policies and political decentralization based on Federalist ideas] accepted innovations, left behind old techniques and norms, rejected slave-based forms of labor, espoused capitalist relations of production and aspired to reforms insofar as they became more powerful (...) The reformist ideas of the time, fiercely rejected by the first [the conservative classes related to the Empire], encountered receptivity in the second: the abolition of slave-ownership, universal suffrage, political turnover, a Federal Republic, everything, to sum up, that a Republican regime had to offer. In the manipulation of the economic policy (...) the interests of one fraction were in contradiction with those of the other, and the struggle for that manipulation became more acute”.

Not coincidentally, the main political agenda of the PRP was to strive for political as well as fiscal decentralization under the auspices of liberal-bourgeois ideological justifications (Casalecchi, 1987; Costa, 1989; Prado Jr., 1962; Topik, 1987; Love, 1980). The main political figures of the PRP, most of them coffee planters in the Western São Paulo, were underrepresented in the Imperial Congress in such a way that the economic interests of the coffee planters in São Paulo could not be advanced in the political arena (Reis, 1980; Love, 1980). In this political context, the Republican movement that had

emerged in São Paulo was vociferous against the Imperial government because the main political figures inside the movement saw the centralization of Empire as an impediment to the economic progress of São Paulo. The growing resentment of the Republicans from São Paulo against the Empire, and the consequent struggle for a federal Republic were not unjustifiable, according to Love (1980, pp. 103-104): “in 1886-87, São Paulo contributed eight times as much to the central treasury as it received back in outlays. Politically the province was unable to remedy this state of affairs, for it was clearly underrepresented in the Imperial parliament by the 1880s. The Republicans of São Paulo called for a distribution of revenues that would allow the province to meet the requirements of the expanding export economy, and for political autonomy to maximize São Paulo’s economic potential (...) Some Paulista Republicans even threatened to set a separatist course for their province if a federation was not achieved”.

Moreover, the Republican movement in São Paulo – particularly the PRP – vehemently chafed at what they considered to be a suffocation of the freedom of initiative in economic matters. As Casalacchi (1987) narrates, in his extensive research on the emergence of Republican ideas in São Paulo, the Empire was seen as a barrier to the entrepreneurial spirit of the coffee planters in the province. In light of the outstanding material progress of São Paulo after the economy of the state entered the export-led circuit of accumulation via coffee production, the main planters in São Paulo emphasized, in their discourse, the spirit of initiative of coffee planters as well as their role as carriers of economic and social progress in the Brazilian society (Casalecchi, 1987; Love, 1980; Costa, 1989). More importantly, coffee planters in São Paulo saw the bureaucratic centralization imposed by the Imperial regime as an obstacle to capitalist development (Prado Jr., 1962). For

instance, Alberto Salles, one of the most prominent architects of Republican ideas among the elites in São Paulo, defended the coffee economy as the core element of a capitalist arrangement of accumulation based on the diversification of investments made possible by the growing profits in the hands of planters. In the words of Casalecchi (1987, p. 19-20), “(...) Salles understood the economy of São Paulo, where the cultivation of coffee was a central element, as the dynamic pole of a complex comprised by the defense of immigrant labor, the growth of railroads, the geographical expansion [of the economy based on coffee production], the industrial surge, and the development of the financial as well as the commercial sectors (...) The Monarchical regime was, for landowners and “capitalists” of the province, an impediment to the social and material progress of São Paulo”.

Although the Republican movement in Brazil - which was led by the PRP and consequently by the most influential coffee planters of São Paulo - propagated liberal-bourgeois ideas in order to erode the political legitimacy of the Imperial government, the main goal of Republican landowners was to capture the political institutions of Brazil to promote the advance of capitalism in the country (Font, 1990; Reis, 1980). To put it bluntly, the Republican movement in São Paulo was never a genuine project of political transformation; the political institutions in Brazil, over the course of the First Republic, were not radically transformed: in spite of the expansion of the suffrage after the advent of the Republic, in 1889, the electoral system was rife with fraudulent practices oriented to legitimizing the dominance of local political bosses who reinforced the political power of the PRP in São Paulo (Casalecchi, 1987; see also Love, 1980)²³. As Casalecchi (1987) points out, the

²³ In an electoral system that guaranteed neither the secrecy of the vote nor the independence of voters from the economic power of local political bosses, violence and widespread electoral fraud secured the dominance of the PRP – and, by extension, of coffee planters in São Paulo - in the policy-making mechanisms of the

unchallenged dominance of the PRP in the political scenario of São Paulo during the first two decades of the Republic was based on the political manipulation of the electoral institutions in the state as well as on the economic dependence of voters on local political bosses – in the geographically expanding economy of São Paulo, capitalist coffee planters dominated the local political state of affairs, and filled the role of the state in regions where public institutions were underdeveloped vis-à-vis the economic prosperity anchored by the thriving coffee economy (see also Leal, [1949]2009; Monbeig, [1952]1984; Love, 1980).

In the same vein, Prado Jr. (1962) brilliantly describes the transition from the Empire to the Republic led by the prominent coffee planters of São Paulo as a project of social transformation oriented to the accomplishment of economic interests²⁴ (see also Costa, 1989; Casalecchi, 1987). The capture of

Brazilian government from the dawn of the First Republic to mid-twenties, when new social forces emerged, with the foundation of the Democratic Party (PD), to politically challenge the monopoly of the PRP over the state apparatus (Font, 1990; see also Love, 1980). Local bossism (*coronelismo*) was particularly strong in cities and regions that had been recently occupied by the frenetically expanding coffee frontier (Monbeig, [1952]1984). In these newborn cities, the presence of state was weakly felt, and the expansion of frontier was undertaken by political alliances between local bosses and the main political figures of the PRP, who dominated the state apparatus. On the one hand, local bosses secured a steady source of voters for the PRP, whereas the PRP, in its turn, legitimized the occupation of land by pioneers by granting local bosses deeds over the possession of new territories for coffee cultivation (Monbeig, [1952] 1984; Love, 1980; Casalecchi, 1987). In this sense, possession of land for coffee cultivation – which was an essential feature of the “primitive” capital accumulation for manufacturing in later years - was not defined in the “struggle” of market forces but via privileged political relationships forged within the PRP (Casalecchi, 1987). Violence as well as electoral fraud boosted the geographical expansion of the capitalist space in São Paulo, as Love (1980, p. 132) narrates: “(...) the frontier – like frontiers everywhere – provided ample opportunity for violence, as desperate men fought for land beyond the reach of the law, even though they expected its arrival in a matter of years. Political assassinations and murders by powerful local bosses did occur (...) on the other hand, São Paulo had its full share of vote fraud, and the forms it took were no different from the practices elsewhere in Brazil – cheating on totals, illegally registering illiterates, voting the dead and buying ballots. And there, as in the other states, when all else failed, intimidation and violence were brought into play”. Moreover, Casalecchi (1987) describes a widespread form of fraud based on the political cooptation of electoral judges as well as electoral clerks. If the results of the electoral process were not favorable for the PRP, electoral clerks simply changed the results by assigning the majority of votes to the candidate of the PRP (this practice was widely known as “the tip of the pen” (*bico de pena*). In case the tip of the pen was hard to operate immediately after elections, the electoral judge blocked the victory of candidates opposing the PRP in the local electoral tribunal (Casalecchi, 1987). For the expansion of the coffee frontier in São Paulo between 1836 and 1935, see the Appendix (Figure 3.7; Figure 3.8; Figure 3.9; Figure 3.10; Figure 3.11).

²⁴ In Prado’s perspective, economic change was a political project carried out by an emerging capitalist class seeking to reap the benefits of a politicized capitalism in Brazil. The liberation of the productive forces, as

the political institutions in the country was a vital step towards the “unleashing” of the entrepreneurial forces within the capitalist class – mainly represented by the emerging coffee planters of Western São Paulo – from the bureaucratic barriers to capitalist accumulation imposed by the Empire (Prado Jr. 1962, pp. 213 and ss.). On the one hand, as I have pointed out, the political institutions crafted by the Republican regime did not match a liberal-bourgeois political arrangement; the ideas of citizenship and participation in the debate of alternative political projects never existed in practice because voters, an insignificant percentage of the population, were economically dependent on the dominant classes (Leal, [1949]2009; Casalecchi, 1987; Love, 1980). On the other hand, and more importantly, state patronage exuded in business practices over the course of the First Republic. In other words, the same economic actors who chafed at politicization of the economy during the final years of the Empire took advantage of privileged channels to state bureaucracy in order to accomplish their interests in the economic field (Prado Jr., 1962). As Reis (1980, chapter five) eloquently shows, the coffee planters of São Paulo – the most liberal social group on the eve of the

Prado describes it, was promoted by active state intervention in the economy in such a way that the newborn Republican state apparatus paved the way for the expansion of business opportunities – which benefited the new dominant economic class led by the coffee planters of São Paulo (Love, 1980; see also Costa, 1989; Reis, 1980, chapter five). As Prado describes: “In the economic arena we witness the eruption of a spirit that, albeit not new, was kept in the darkness and was obfuscated [in the Imperial regime]: an intense desire for wealth as well as material prosperity. This was not a legitimate ideal over the course of the Empire, and it was not fully recognized [as being legitimate]. The new regime will make that spirit a legitimate ideal. The contrast between the two periods, before and after the advent of the Republic, can be assessed, among other features, by the relative position of businessmen, i.e. the individual who is thoroughly oriented to becoming rich in their economic activity. This individual during the Imperial regime was a despicable figure. The Republic will bring them to a central and dominant position (...) The politicians themselves will partake those new business opportunities, and a spectacle of ministers and high authorities involved in business activities will be frequent (...) None of the impediments that the moral and the social conventions that the Empire imposed on speculative spirit as well as on business activities will survive; the ambition for profit and for wealth will be legitimized as a high social value” (Prado Jr., 1962, pp. 214-15). Not coincidentally, the economic reforms implemented by the new Republican government, as I have shown, sought to expand the monetary supply in the economy and to encourage new firm formation by deregulating the private sector (Stein, 1957).

Republican transition – fiercely fought for permanent state intervention in the coffee market seeking to protect the income of planters in a context of overproduction (see also Topik, 1987; Costa, 1989). Furthermore, the most important pillars of economic transformation in São Paulo – the immigration policy, the permanent defense of coffee, and the development of railroads – were undertaken with heavy public investments (Holloway, 1980; Matos, 1973; Casalecchi, 1987).

In contrast with the ideas of the young Schumpeter on entrepreneurship (cf. Schumpeter, [1911]2002; cf. Schumpeter, [1911]2003), what the historical roots of the industrialization of São Paulo show is that economic change, boosted by the pushing through of new economic combinations, might also emerge as a result of changes in extra-economic spheres of society. The social roots of the industrialization of São Paulo compellingly illuminate *an entrepreneurial circuit in which the political sphere is not mere static data in the economy, or a context for economic transformation*. Economic actors resort to politics in order to bring new combinations into light, and *these combinations can only happen if the political structures of society are changed to conform to the interests of entrepreneurial leaders*²⁵. Politics is, therefore, part and parcel of economic change. In this

²⁵ Although Schumpeter recognizes that political changes influence the economy, he rejects that economic change - or new qualitative combinations in the economy – might be organized and partially carried out in extra-economic fields of society. On this point, Schumpeter says: “many, and in particular the strongest individuals would behave different from what the theorems of statics lead us to assume. But how? They will create something new and destroy the old thing, conceive and carry out bold plans, which, whatever their nature, seem to ridicule any attempt of being grasped. The strongest individuals will subjugate their fellow citizens to their rule, *they might influence the national politics and organization*, change the ‘natural’ course of the economy through legitimate and illegitimate means, and in any case through other means than merely ‘exchange’ etc. In the face of this, what can we possibly do? Surely, we cannot provide a brief summary of all this. It is natural, however, to narrow down our focus, not only to expressions of energetic will in the economic sphere, but also expressions that come about solely by economic means.” (Schumpeter, [1911]2002, p. 409) [Emphasis added].

sense, economic change and political change might happen simultaneously as economic agents pursue their interests.

As an ample social venture, thus, the entrepreneurial circuit, in some historical cases, can only be *fully* accomplished as interests of economic agents leading to new combinations in the economy are organized in social spaces *beyond* the economic arena. The economic transformations that paved the way for the industrialization of São Paulo were, in large measure, carried out in the political arena as the economic elites, led by the coffee planters in the West lands of the state, sought to manipulate the economic policies at the sub-national and national levels of governance to the extent that their economic interests could prevail (Love, 1980).

In order to fully understand the roots of industrialization of São Paulo, the notion of *political capitalism* (Weber, 1978, pp. 165-66; see also Swedberg, 1998, pp.46-48) - which has somewhat been ignored by analysts delving into Weber's perspective on the state - is central to the analysis of the relationship between the economic field and the political sphere in Brazil. The connection between political struggles for power and capitalism emerges from the meaning attached by individuals and social groups to profit-making economic activities. As a consequence, the capitalist circuit of accumulation might be *embedded in privileges* attained by some individuals and social groups in the web of social relationships between political organizations and society. The reproduction of capitalism, under this arrangement, largely depends on opportunities for investments guaranteed by the state – either by providing the privileged social groups with social legitimacy to “internalize” the dynamics of capital accumulation or by channeling state resources directly to the main economic activities of those privileged social groups. In Weber's terms, “politically oriented capitalism” (Weber, 1978, p. 166) is defined as

“orientation to opportunities for predatory profit from political organizations or persons connected with politics. This includes the financing of wars and revolutions and the financing of party leaders by loans and supplies (...) It may be orientation to the profit opportunities in continuous business activity which arise by virtue of domination by force or of a position of power guaranteed by the political authority (...) It may be orientation to profit in unusual transactions with political bodies” (Weber, 1978, pp. 164-65).

Under the array of social relationships that produce the political type of capitalism, in which profit-making largely depends on the relationship between economic agents and political elites - two social groups that clearly overlap in the First Republic in Brazil (Hanley, 2004; Love, 1980; Reis, 1980; Casalecchi, 1987; Prado Jr., 1962; Villela & Suzigan, 1973), the state might devise economic policies oriented to protecting the sources of profit of privileged economic groups; in the Brazilian case, the coffee planters of São Paulo, who were the epicenter of industrialization, took advantage of their deep-seated influence over the state apparatus, after the overthrow of the Empire, to promote their own economic interests – thereby posing barriers to the development of rational capitalism. As he argues on the relationship of monopolistic profit-making enterprises (clearly an economic privilege conceded to specific social groups) and the state, Weber (1978, p. 200) says: “(...) they [measures to finance the state via monopolistic profit-making enterprises] tend to repress it [market-oriented rational capitalism] by fiscal measures which, from the point of view of the market are irrational, such as the establishment of privileges and opportunities for money making through other channels. They are, on the other hand, under certain conditions favorable to politically oriented capitalism”.

Although a political type of capitalism predominated in the entrepreneurial movements led by the most prominent coffee planters in São Paulo, the emergence of rational capitalist practices in the circuit of accumulation paved the way for higher profits in the coffee economy. These rational elements in the coffee economy created the conditions for the transfer of profits to the manufacturing sector over the course of the First Republic (Cano, 1981; Mello, [1975]2009). As Cano (1981) points out, the most advanced coffee estates in São Paulo invested heavily in coffee-processing machines that substantially augmented the productivity levels of farms – and, consequently, the profitability of the coffee economy as a whole (see also Mello, [1975]2009). Moreover, the management of many coffee farms was based on very complex accounting systems implemented by professional bureaucratic teams in the city of São Paulo – where specialized coffee administrators controlled the financial flows of the coffee capitalist enterprise (Monbeig, [1953]2004). Another interesting example of the mixture of rational capitalist forms with politically oriented capitalism was the immigration enterprise subsidized by the state government in São Paulo. In order to attract European immigrants to São Paulo, the *Society for the Promotion of Immigration* – created on the verge of the Republic by coffee planters in São Paulo with substantial subsidies from the state government, engaged in an aggressive advertisement strategy in Europe oriented to enticing workers to come to São Paulo (Holloway, 1980). The *Society for the Promotion of Immigration* inaugurated several offices in Europe (Italy and Spain, e.g.) which were responsible for the distribution of booklets and pamphlets advertising São Paulo as a land of new opportunities for immigrant families (Holloway, 1980). Although the *Society for the Promotion of Immigration* was not a private capitalist enterprise, it was organized and controlled as a complex bureaucratic organization.

These examples are consentaneous with Weber's perspective on forms of capitalist accumulation as pure types. For Weber, the rational type of capitalist accumulation do not exist in reality in its pure form (Weber, 1978); as the case of São Paulo compellingly shows, capitalist accumulation was marked by the coexistence of rational and non-rational forms of capitalism.

2.2. Entrepreneurship as Spatial Change in the Industrialization of São Paulo: recombining space, transforming the economy (1880-1930)

As I have pointed out, not only do the entrepreneurial actions that paved the way for the industrialization of São Paulo have a political dimension but these actions are also embedded in a spatial dimension. The expansion of the coffee economy, and the foundation of cities and regions in São Paulo, in the wake of new and more productive coffee plantations, emerged as a result of the economic interests of planters who sought to expand the scope of capitalist accumulation in the state (Milliet, 1941).

The development of a regional mentality, as Monbeig ([1952]1984), was a central element in the "carving out" of new spaces of capitalist accumulation in unexplored lands in the Western São Paulo. Consequently, the pioneer fronts towards the most remote Western regions of São Paulo were organized around the railroad network, which expanded vigorously after the advent of Republic with heavy investments from planters and generous subsidies given subsequent governments in the state (Matos, 1973). Because the most productive lands for coffee production were located beyond the last cities in railroad routes in the turn of the century, some pioneers had to open up roads to evacuate production from the most distant centers of coffee production to the first city in the railroad network (Monbeig, [1952]1984). This pattern of territorial expansion brings into light an interesting connection between

entrepreneurship and politics: planters in the most remote regions of the state argued that they were in a situation of disadvantage in relation to coffee estates which were located closer to the railroad network; these pioneer planters, as a consequence of their position in the coffee markets, struggled for the expansion of the railroad network to the most remote areas of São Paulo – where their coffee estates were located (Matos, 1973; Casalecchi, 1987). On the other hand, the PRP, interested in expanding its political dominance in São Paulo, supported the rapid expansion of the railroads in the state in order to attend the interests of those planters, who would be a source of secure votes for the PRP in the electoral process (Casalecchi, 1987; Monbeig, [1952]1984).

As Matos (1973) and Casalecchi (1987) point out, those most remote areas of the state became the most loyal sources of political support for the PRP over the course of the First Republic. Furthermore, Monbeig ([1952]1984) detailed shows that the PRP consolidated its political dominance in those most remote areas of coffee cultivation by resorting to violence; every time an opposition leader campaigned against the PRP in those regions, local bosses – i.e. important coffee planters - intimidated potential opposition voters by adopting coercive means, which sometimes led to assassinations of opposition leaders as well as voters (Casalecchi, 1987; Love, 1980). The political alliance between the PRP and the pioneers of São Paulo was also a central element in the possession of land insofar as property rights over land were granted by a politicized bureaucratic structure - which was commanded by protégés of the PRP - rather than by market forces (Monbeig, [1952]1984; Casalecchi, 1987; Love, 1980). In most cases of land occupation during the expansion of the coffee frontier in São Paulo, pioneers occupied land without having acquired property rights over the estates; as a consequence, and a system of “exchange

of favors” between the PRP and the local bosses in the frontier regions of the state of São Paulo: the PRP guaranteed social legitimacy over land possession by pioneers in the geographical expansion of capitalism in São Paulo, whereas the local bosses in the expanding territorial arrangement for coffee production co-opted a growing mass of voters for the PRP. As the pioneer areas of the state became consolidated regional economies served by railroads, the political power of the PRP in those regions was almost unchallenged (Casalecchi, 1987; Monbeig, [1952]1984; Leal, [1949]2009)²⁶.

The territorial expansion of the state led by pioneer coffee planters created the economic conditions for the emergence of the manufacturing sector in the dawn of the twentieth century.

First, the massive flows of immigrants to those regions – which were the main destinations for the immigrant labor force subsidized by the state of São Paulo after the advent of the Republic (Holloway, 1980) – engendered a consumer market for manufactured products as well as promoted an

²⁶ The expansion of capitalism in Sao Paulo – which was the basis of the industrialization in early twentieth century – compellingly illustrates a connection made by Lefebvre ([1970]2009) between space and politics; the movements of production of space are not politically neutral nor are they disconnected from the interests of dominant classes (see also Lefebvre, 1991). As a consequence, the production of space – physical as well as social – goes hand in hand with the interests of dominant groups who appropriate spatial relations in order to consolidate their position in the mode of production; this was clear the case of coffee planters who subordinated the production of space to their interests in the economic arena – not only did those interests carve out new spaces of production in Sao Paulo but they also shaped the physical properties of territorial development in the Western Sao Paulo, as I have shown by bringing into light the role of railroad development in the accumulation of capital for manufacturing. Since the *legitimate possession of land as a source of utilities* – or the power of control and disposal, in Weber’s terms (Weber, 1978, p. 67) – was guaranteed by privileged political connections in the expanding frontier of the state (Monbeig, [1952]1984; Casalecchi, 1987; Love, 1980), the reproduction as well as the recombination of space in Sao Paulo were embedded in the political type of capitalism under the dominance of the oligarchical groups led by coffee planters of Sao Paulo. As Lefebvre ([1970]2009, pp. 170-71) points out, space is a locus of history rife with contradictions: “space is not a scientific object removed from ideology or politics; it has always been political and strategic (...) space has been fashioned and molded from historical and natural elements, but in a political way. Space is political and ideological. It is a product literally populated with ideologies. There is an ideology of space. Why? Because space, which seems homogenous, which appears given as a whole in its objectivity, in its pure form, such as we determine it, is a social product. The production of space cannot be likened to the production of any particular object or commodity. Nonetheless, there are relations between the production of things and that of space. The latter accrues to private groups who appropriate space in order to manage and exploit it. Space is a historical product – like anything else – but, moreover, is historical in the classic sense of the term”.

accelerated urbanization of the state of São Paulo over the course of the First Republic; new urban centers concentrated an incipient commercial and financial sector that came into light to attend the necessities of the new workforce (Negri, Gonçalves, & Cano, 1988). The vertiginous geographical expansion of the state engendered strong complementarities between the agricultural sector and the industrial sector emerged: the labor force related to agriculture was the main consumer of manufactured products, and labor turnover in the rural areas of São Paulo provided the city of São Paulo with a valuable source of industrial workers (Morse, 1970; Holloway, 1980). As Holloway (1980) shows, the subsidized immigration program in São Paulo imported more immigrants than could be absorbed by the export sector of the economy, thereby generating a surplus of labor which boosted the urbanization of the capital as immigrants took the trains to the main urban area of the state searching for job opportunities (see also Morse, 1970). In fact, many workers lied to Brazilian authorities so that they could be eligible to the subsidized travel. In order to be eligible for the immigration program, workers must be classified as agricultural workers; nonetheless, some workers narrated that they had never been related to agriculture – they lived in urban areas of Europe, mainly Italy, and worked for manufacturing shops there. Not coincidentally, the city of São Paulo concentrated many manufacturing shops run by immigrants in the first years of the twentieth century (Cardoso, 1969; Holloway, 1980).

Second, the movements of capital in the expanding pioneer regions reinforced the diversification of capitalist development in the state of São Paulo: new urban centers came to the fore on the fringes of the railroads; new manufacturing sectors emerged to cater for a rapidly growing consumer market; the spirit of savings brought into the economic circuit by immigrant

workers attracted a large number of foreign banks to São Paulo – the same banks which engaged in venture capitalism in the first years of the twentieth century, particularly before the First World War (Dean, 1969; Saes & Szmrecsanyi, 1995; Negri, Gonçalves, & Cano, 1988; Negri, 1996; Cardoso, 1969)²⁷. Moreover, foreign banks were actively involved in the expansion of the infrastructure in São Paulo: gas, phone services, electrical power stations, and urban transportation were partially financed by foreign banks, thereby complementing the investments coming from planters connected to the export sector (Saes & Szmrecsanyi, 1995; Cano, 1981). In some cases, foreign banks acquired shares in manufacturing firms in order to diversify their investments (Saes & Szmrecsanyi, 1995)²⁸.

In order to understand the relationship between space and entrepreneurship - and, more broadly, the relationship between space and social change, it is important to conceptualize space not only as a container of physical properties but also as a mosaic of social practices. As a tapestry of social relationships, space is constantly subject to being molded and remolded by the constellations of interests that produce the daily fabric of social life.

For Lefebvre ([1977], 2003), the spatiality of society is produced in a junction between the physical space and the social space. Although space is perceived as an array of physical and therefore palpable properties, the production of space is also a social endeavor and, as such, it is a product of

²⁷ Francisco Matarazzo, who founded the most important industrial conglomerate in Brazil until the mid-twentieth century, was financed by the London and Brazilian Bank in his first venture in the manufacturing sector – a flour mill (Saes & Szmrecsanyi, 1995, p. 236; see also Dean, 1969).

²⁸ Between 1887 and 1920, the operations of foreign banks in São Paulo experienced outstanding growth. The evolution of the participation of foreign banks in the share of deposits and loans in the state can be seen in the Appendix (Figure 3.12 and Figure 3.13). As I have pointed out, the entrepreneurial history of the state of São Paulo over the course of the First Republic shows that the substantial growth of the financial sector in São Paulo, led by foreign banks, was responsible, to a large extent, for the financing of new industrial ventures in São Paulo – with great involvement of immigrant entrepreneurs (Dean, 1969). These entrepreneurs were generally upper class Europeans who came to Brazil in search of new business opportunities – thus they were not subsidized immigrants (Dean, 1969).

struggles, domination, power and ideologies (see also Lefebvre, [1970]2009). This distinction is clear in Lefebvre's discussion of the spatiality of states. According to Lefebvre ([1977]2003, p. 84), states are produced in two spatial movements, physical and social: "(...) the production of a space, *the national territory*, a physical space, mapped, modified, transformed by networks, circuits, and flows that are established within it – roads, canals, railroads, commercial and financial circuits, motorways and air routes, etc. Thus space is a material – natural – space in which actions of human generations, of classes, and of political forces have left their mark, as producers of durable objects and realities (...) the production of a *social space* as such, an (artificial) edifice of hierarchically ordered institutions, of laws and conventions upheld by 'values' (...) the family, the school, the workplace, the church, and so on – each possesses an 'appropriate' space. Appropriate for what? For a use specified within the social division of labor and supporting political domination". Moreover, it is clear in Lefebvre's work that space, under capitalist arrangements of production, is not a passive locus of social relations. Space itself changes to attend the interests of capitalist classes and, as a consequence, the spatial configuration of society is a product and producer of history, as Lefebvre (1991) cogently argues.

Consequently, the relationship between space and capitalist entrepreneurship is not only embedded in the social relations that take place in a given territorial configuration but *it is also embedded in the material and extra-material properties that make spatial configurations sources of utilities*; in the Weberian sense, utilities are opportunities for immediate or future use of goods (objects) and services (social relationships), including profit-making (Weber, 1978, pp.

68-69; see also Swedberg, 1998, pp. 28-29)²⁹. Because the spatial configuration of utilities varies across national and sub-national territories, economic agents – oriented to accomplishing their interests in the economic arena – manipulate the spatial configuration of the economy as they search for continuous opportunities for profit – and consequently expand the capitalist circuit of accumulation in distinct territories. The social roots of the industrialization of São Paulo illustrate that the movements of spatial expansion of capitalism in the state – and the exploitation as well as recombination of space as a source of opportunities for profit – engendered, to a substantial extent, the surpluses of capital that were later directed to manufacturing development, commercial and financial activities outside the core activities of the coffee economy.

In those spatial movements leading to territorial expansion of capitalism, economic agents seeking to accomplish their interests in the economic arena exploit as well as reorganize the spatial configuration of utilities; in so doing, they might promote a *qualitative recombination* in the way the capitalist circuit of accumulation socially works. As I have shown, the first strokes in the

²⁹ In Weber's words, utilities are defined as "the specific and concrete, real or imagined, advantages (*Chancen*) of opportunities for present or future use as they are estimated and made an object of specific provision by one or more economically acting individuals. The action of these individuals is oriented to the estimated importance of such utilities as means for ends of their economic action. Utilities may be the services of non-human or inanimate objects or of human beings. Non-human objects which are sources of potential utilities of whatever sort will be called 'goods'. Utilities derived from a human source, so far as this source consists in active conduct, will be called 'services'. Social relationships which are valued as a potential source of present or future disposal of utilities are, however, also objects of economic provision. The opportunities of economic advantage, which are also made available by custom, by the constellation of interest, or by a conventional or legal order for the purposes of an economic unit, will be called 'economic advantages'" (Weber, 1978, pp. 68-69). The Weberian concept of utility is paramount in a theoretical nexus between entrepreneurship and space insofar as that concept connects economic action to spatial change. On the one hand, as individuals and social groups pursue their interests in the economy by seeking to expand their control over utilities, they might change the spatial organization of society – as the most prominent coffee planters of São Paulo did by expanding the scope of capitalism in the state – new coffee estates, the railroads, the subsidized immigration program, the development of manufacturing and other sectors outside the coffee complex. On the other hand, spatial change might promote changes in the economy as a whole by engendering new ways of organizing the economy; moreover, spatial change might lead to the expansion of the utilities in a given economy, which, in turn, expand the scope of opportunities for profit to individuals and social groups who are not originally related to the movements leading to that expansion. As I have pointed out, many immigrant entrepreneurs came from Europe in order to take advantage of the opportunities for investment created by the export-led sector of the economy.

industrialization of São Paulo - as a historical sequence of entrepreneurial actions over the course of the First Republic - is a partial product of the geographical expansion of the capitalist circuit of accumulation in the state: coffee planters, in search of the most productive lands for coffee cultivation in the Western São Paulo, carved out new spaces for capital accumulation, and founded cities that are nowadays important urban centers in the state (Monbeig, [1952]1984; Negri, Gonçalves, & Cano, 1988; Negri, 1996).

As explored in this chapter, the connections between entrepreneurship, politics and space show that economies of agglomeration, in historical perspective, are built by relationships of power, domination and inequality.

3. Concluding Remarks

The main contribution of this chapter, if any, was to unveil the socio-economics of entrepreneurship from a perspective that involves a broader range of interests than those which are commonly analyzed in the literature on economic change. As the paths of economic change that characterized industrial development in São Paulo in the dawn of the twentieth century illustrate, entrepreneurship – i.e. the pushing through of new combinations in the economy – might not be undertaken exclusively within the economy; rather, economic agents might promote innovations in the economy by resorting to extra-economic arenas of society to accomplish their interests. In other words, the industrialization of São Paulo is a socio-economic instance where entrepreneurship is “stretched” to social arenas *outside* the traditional Schumpeterian entrepreneurial circuit – which takes place *within* the economy (cf. Schumpeter, [1911]2003; cf. Schumpeter, 1934).

This chapter also opened up an analytical avenue which is virtually unexplored in entrepreneurial studies. As an agenda for future research, an

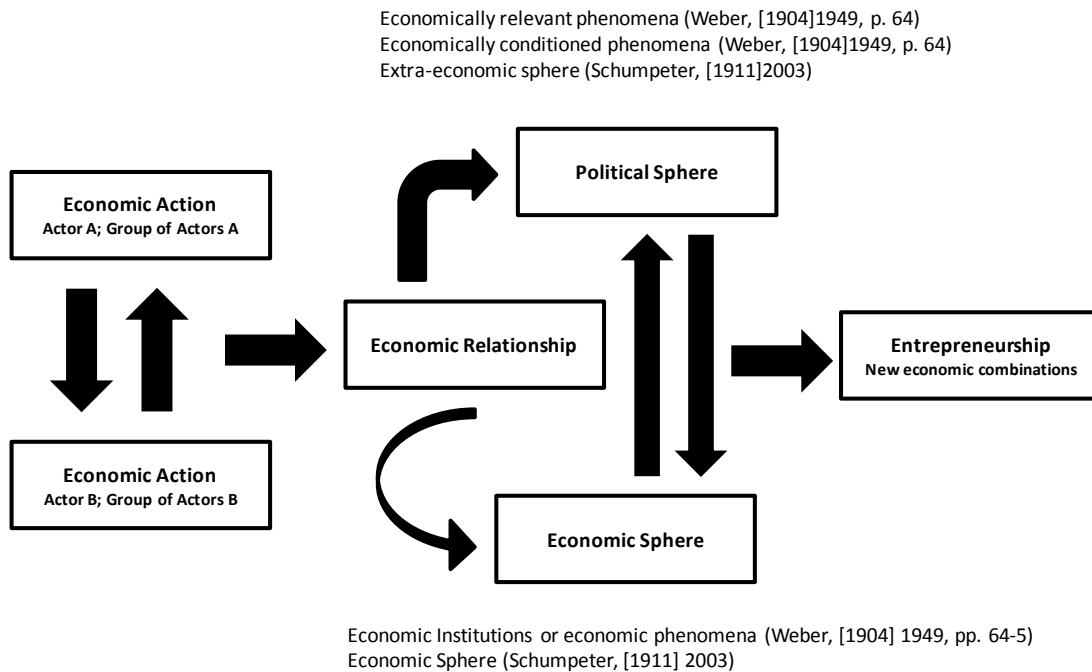
interest-based perspective on entrepreneurship seems promising. By connecting interests to the circuit of innovation – and, by extension, to economic change – it is possible to understand *how* the entrepreneurial circuit is socially organized in *different types of capitalism*. As I have shown, new economic combinations, particularly in territories where political capitalism prevails, mobilize constellations of interests outside the economy because profit-making activities are dependent on privileged political connections. It is clear from this chapter that the industrialization of São Paulo would have never happened without political patronage – which, in turn, politicized the state bureaucracy over the course of the First Republic.

From a Weberian point of view, the entrepreneurial movements that paved the way for the industrialization of São Paulo are comprehensive socio-economic phenomena. For Weber ([1904]1949, p. 65), economic phenomena are characterized by the subjective orientation of individual interests towards “the material struggle for existence” in a context of scarcity of means to accomplish those interests. Nonetheless, Weber ([1904]1949, p. 65) argues that the accomplishment of material interests are not only *influenced by social relations outside the economy* but they also *influence other spheres of social life beyond the economic sphere*. Consequently, the struggle for the material existence as well as the struggle for the expansion of power of control and disposal over utilities in a context of scarcity is influenced by extra-economic spheres of social life, as the case of the industrialization of São Paulo shows. In other words, the political engagement of the economic elites in São Paulo *was not* exclusively oriented to ideal interests – i.e. interests disconnected from the desire for material accumulation; despite the fact the discourses of planters in São Paulo might lead us to think that their political engagement sought to bring citizenship to an oppressed mass of peasants and poor urban workers, the

history of the industrial development in São Paulo compellingly illustrates the use of politics to the accomplishment of interests in the economy – or material interests, in Weberian terms (Weber, 1978; Weber, [1904]1949). As they pursued their material interests in the political field, the most prominent coffee planters of São Paulo promoted a sequence of economic changes that ultimately led to the surge of manufacturing in São Paulo – Dean (1969) suffered reactions from influent sectors of the Brazilian social science when he seminally studied planters of São Paulo from a Schumpeterian perspective to explain the origins of industrialization in São Paulo (cf. Martins, 1973; cf. Mello, [1975]2009). Nevertheless, Dean (1969) does not capture the organization of innovation inside politics; nor does he analyze entrepreneurship as a manipulation of space, as I tried to advance in this chapter.

This “missing link” in the study of entrepreneurship in Brazil might open up a Weberian avenue of analysis in future studies. As individuals and social groups pursue their economic interests in extra-economic arenas of society, such as politics, they transform those arenas into economically relevant phenomena (see Figure 2.1). When new economic combinations are brought into light as a consequence of movements in economically relevant phenomena, then we have an entrepreneurial circuit that does not match the classic Schumpeterian entrepreneurial function (cf. Schumpeter, [1911]2003).

Figure 2.1 – The Circuit of Entrepreneurship in the Industrialization of São Paulo



Source: Schumpeter ([1911]2003); Weber ([1904]1949); Weber (1978).

If we want to understand entrepreneurship in different capitalist contexts, we must resort to the constellations of interests in different societies and their influence on economic change. There is much to be done. But there is a way to begin with: “*follow the interests!*” (Swedberg, 2005, p. 32).

APPENDIX

In this appendix, the reader will find graphs and maps that depict the economic conditions that paved the way for the industrial growth of São Paulo during the first four decades of the twentieth century.

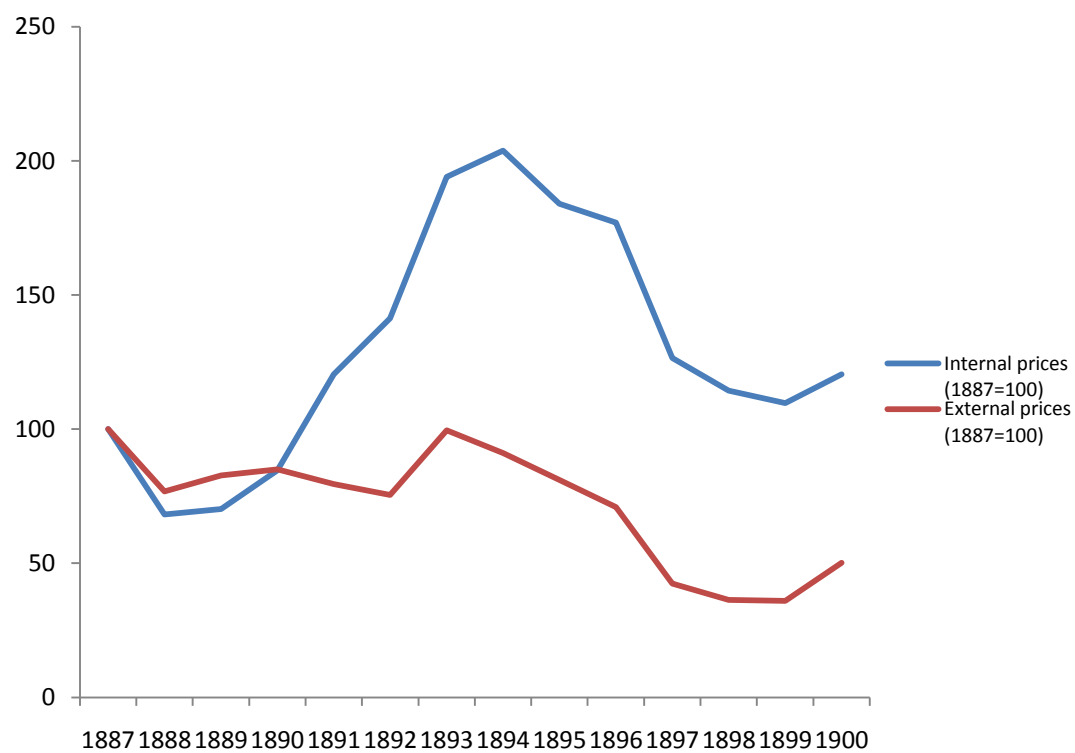
First and foremost, the figures in this appendix illuminate the movements of income concentration in the main export-oriented sector of the Brazilian economy after the advent of the Republic, in 1889. As the reader will see, the internal prices of coffee were higher than the external prices of that product (see Figure 2.2; Figure 2.3; Figure 2.4); as the economic literature shows, this was one of the main mechanisms that facilitated a concentrated investment capacity in the hands of the main coffee planters in Brazil – most of them were from São Paulo (Delfim Netto, 1973; Villela & Suzigan, 1973). This was the classic mechanism described by Furtado (1977) as socialization of losses – because the whole society had to pay more for imported products in an incipient industrial economy which was not self-sufficient – and privatization of gains, insofar as the devaluation of the currency to protect the income of planters only benefited the export-oriented sector.

Second, the figures in this appendix clearly demonstrate how the coffee economy benefited from the economic policies oriented to defend the interests of the export sector. As the reader can see, the production of coffee was, as a general tendency, higher than the export levels after the advent of the Republic – this pattern becomes clear after the permanent defense of coffee, implemented in 1906 (see Figure 2.5). After 1906, the state created a physical infrastructure to absorb the growing surpluses of coffee – e.g. warehouses financed with public money were used to stock those surpluses (Cano, 1981; Villela & Suzigan, 1973); in some cases, state agencies bought the surpluses of coffee production seeking to manipulate the prices of the

product in international markets (Reis, 1980). Not coincidentally, one of the highest “peaks” in the industrialization of São Paulo occurred between 1906 and 1913. As I have already described in this paper, the entrepreneurial movements leading to the development of the manufacturing sector in São Paulo took advantage of complementarities between the income concentration in the coffee economy and opportunities for investment that emerged in other sectors of the economy – manufacturing was one of the main recipients of investments originating from the coffee complex (Cano, 1981; Mello, [1975]2009; Silva, 1985). The imports of industrial equipment soared after 1906 and came to a halt following the outburst of the First World War (1914-1918), as the reader can see in Figure 2.6.

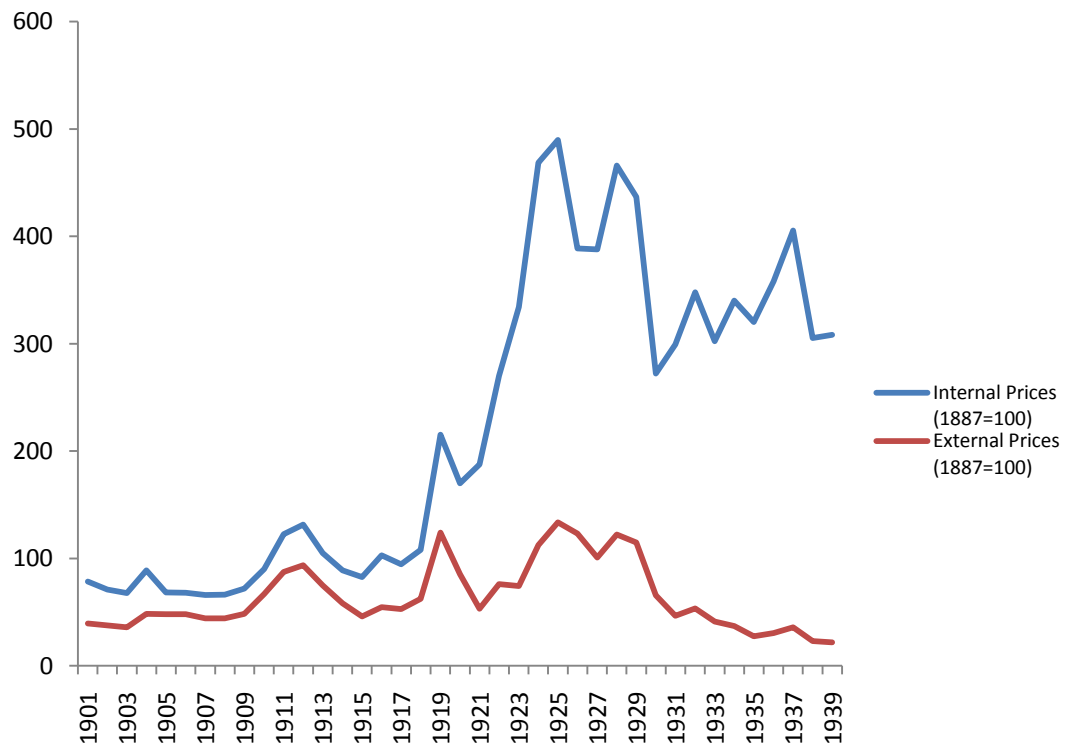
Third, the territorial expansion of capitalism in São Paulo reinforced the opportunities for investment in manufacturing, given the outstanding growth of consumer markets in the state. On the one hand, the expansion of arable lands for coffee cultivation – which was more intense between 1886 and 1920 – was only possible because of substantial investments in railroads and the subsidized immigration program. On the other hand, the complementarities between the export sector and the manufacturing attracted multinational banks to São Paulo; these banks were deeply connected to immigration: they captured savings from immigrants and financed the industrial ventures of Europeans looking for new opportunities in the thriving industrial state of São Paulo. These movements in the industrialization of São Paulo are depicted from Figure 2.7 to Figure 2.15. The industrial surge of São Paulo between 1907 and 1939 illustrates well the entrepreneurial burst of São Paulo after the advent of the Republic: between 1907 and 1939, the share of the state São Paulo in the total value of industrial production in Brazil raised from 15.9 percent to 45.4 percent (Figure 2.15).

Figure 2.2 – Brazil: internal and external prices of coffee (1887-1900) (1887=100)



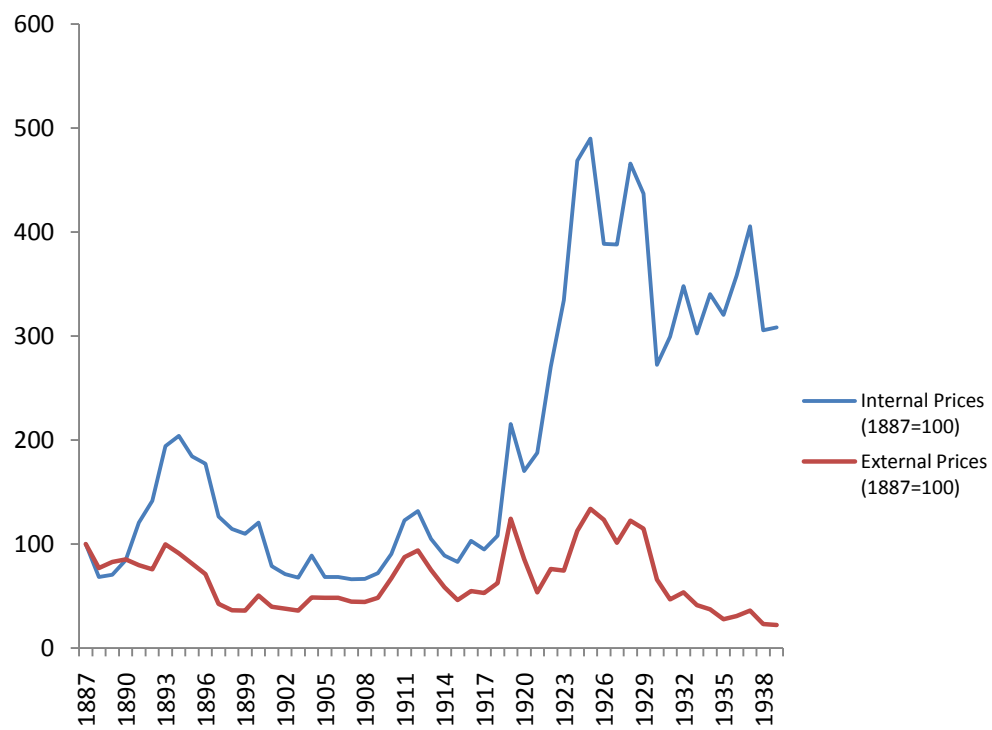
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*.
Author's elaboration.

Figure 2.3 – Brazil: internal and external prices of coffee (1901-1939) (1887=100)



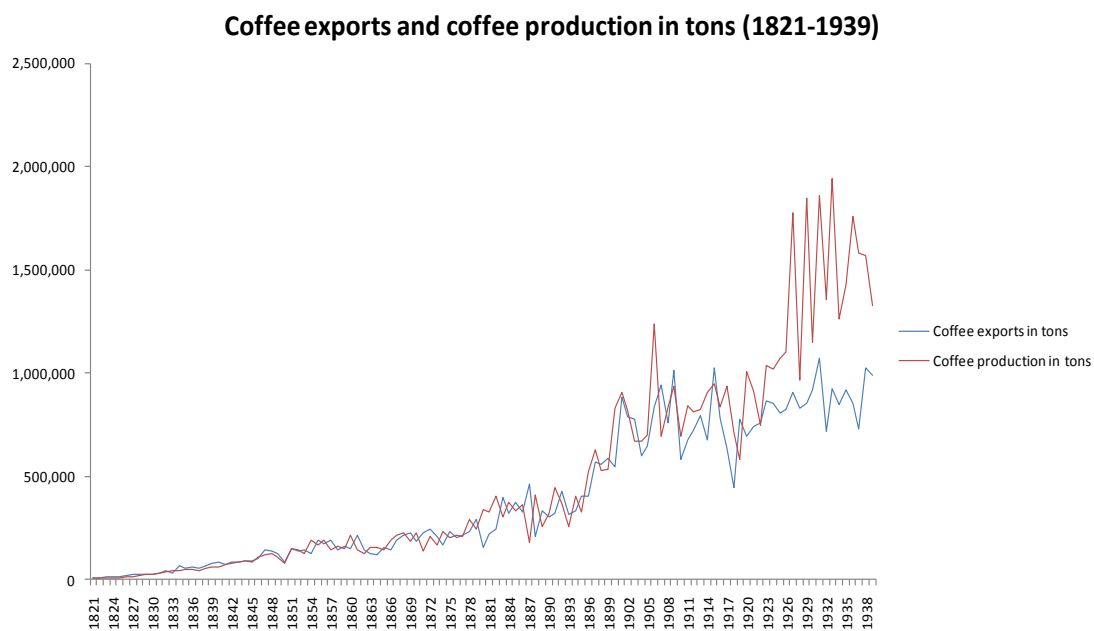
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*.
Author's elaboration.

Figure 2.4 – Brazil: internal and external prices of coffee (1887-1939) (1887=100)



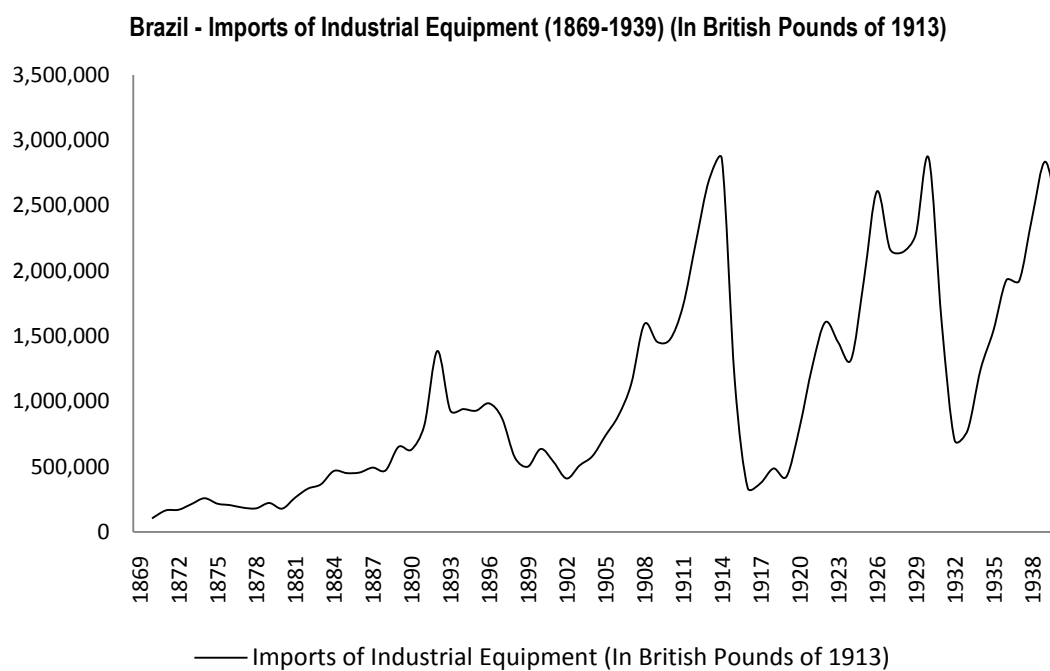
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*.
Author's elaboration.

Figure 2.5 – Brazil: coffee exports and coffee production in tons (1821-1939)



Source: Instituto de Pesquisa Econômica Aplicada (IPEA), IPEADATA. Author's elaboration.

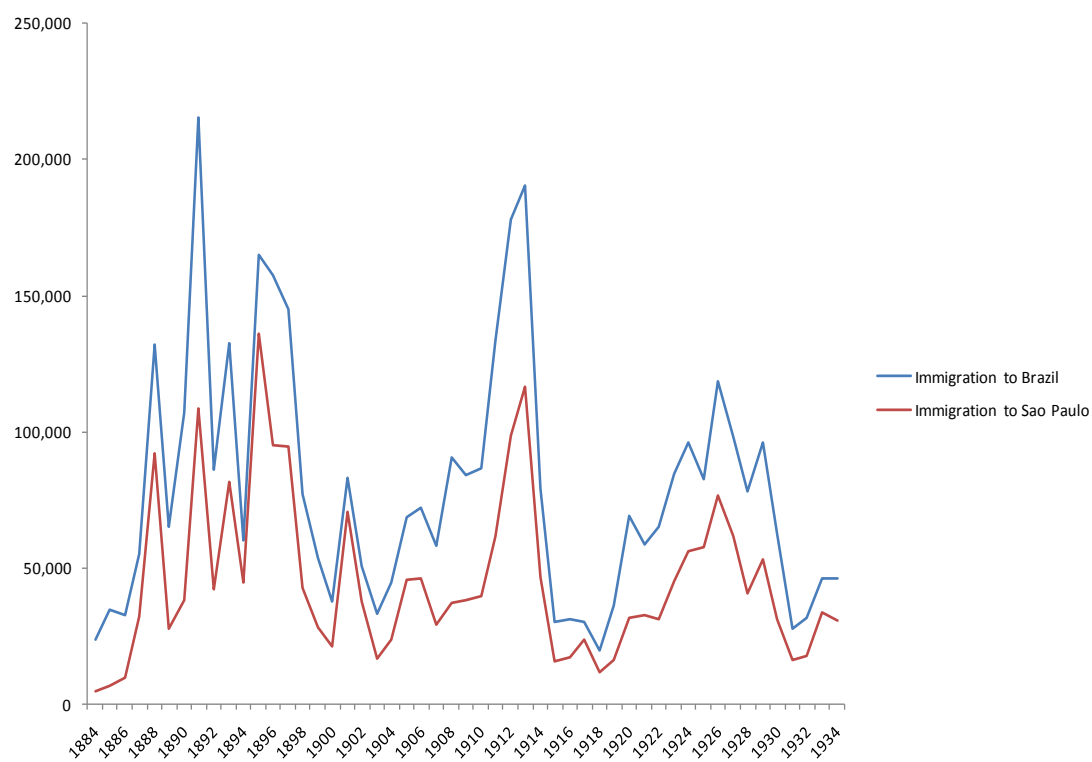
Figure 2.6 – Brazil: imports of industrial equipment (1869-1939)



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*.

Author's elaboration.

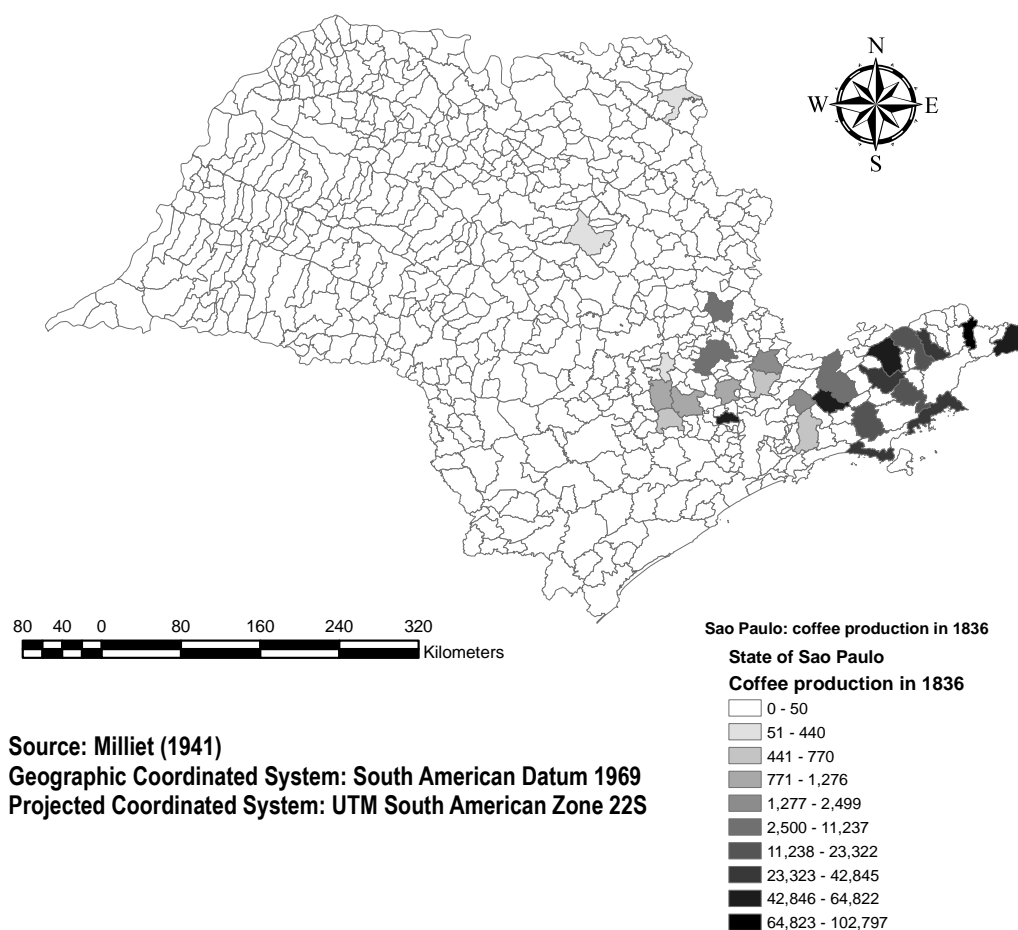
Figure 2.7 – Immigration to Brazil and immigration to São Paulo (1884-1934)



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*. Data for immigration in São Paulo extracted from Holloway (1980, p. 179, Appendix, Table 4).

Figure 2.8 – Regional distribution of coffee production (1836), in arrobas*

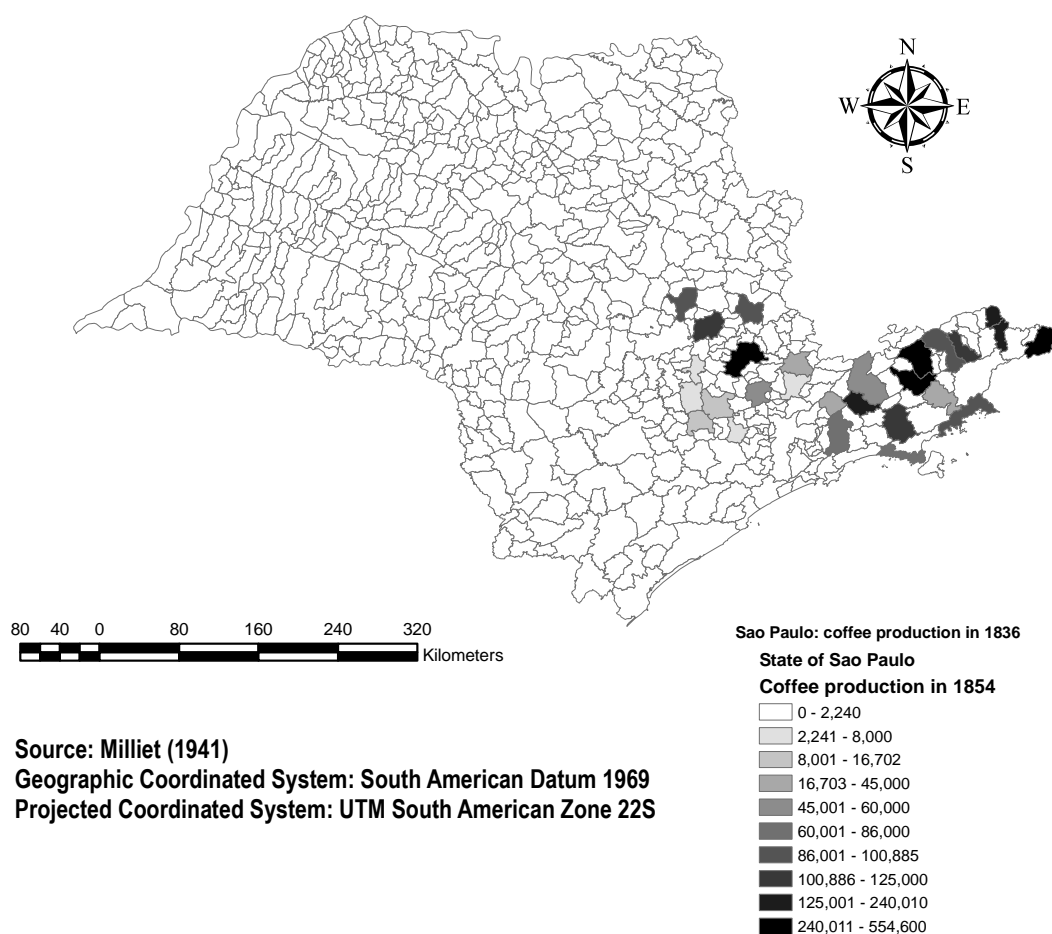
Sao Paulo: regional distribution of coffee production in 1836 (in arrobas)



* One arroba is equivalent to 15 kilograms (or 33 lbs.)

Figure 2.9 – Regional distribution of coffee production (1854), in arrobas*

Sao Paulo: regional distribution of coffee production in 1854 (in arrobas)



Source: Milliet (1941)

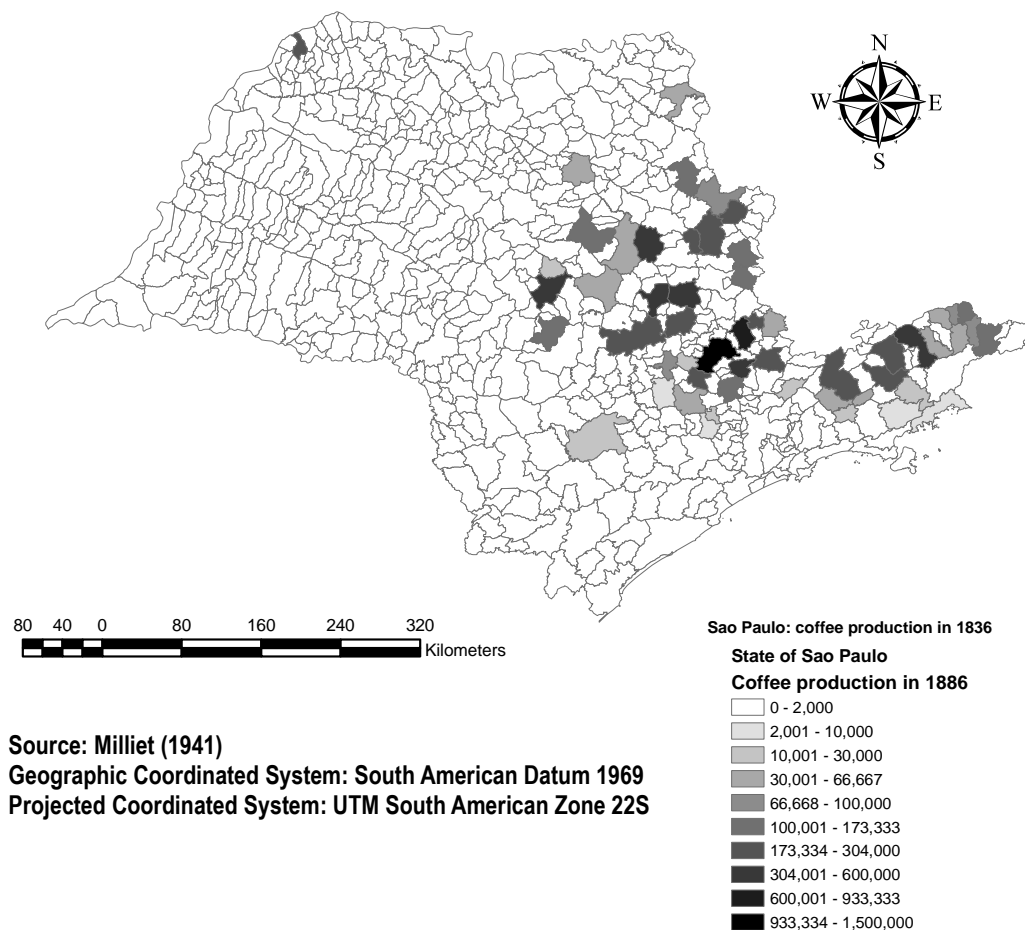
Geographic Coordinated System: South American Datum 1969

Projected Coordinated System: UTM South American Zone 22S

* One arroba is equivalent to 15 kilograms (or 33 lbs.)

Figure 2.10 – Regional distribution of coffee production (1886), in arrobas*

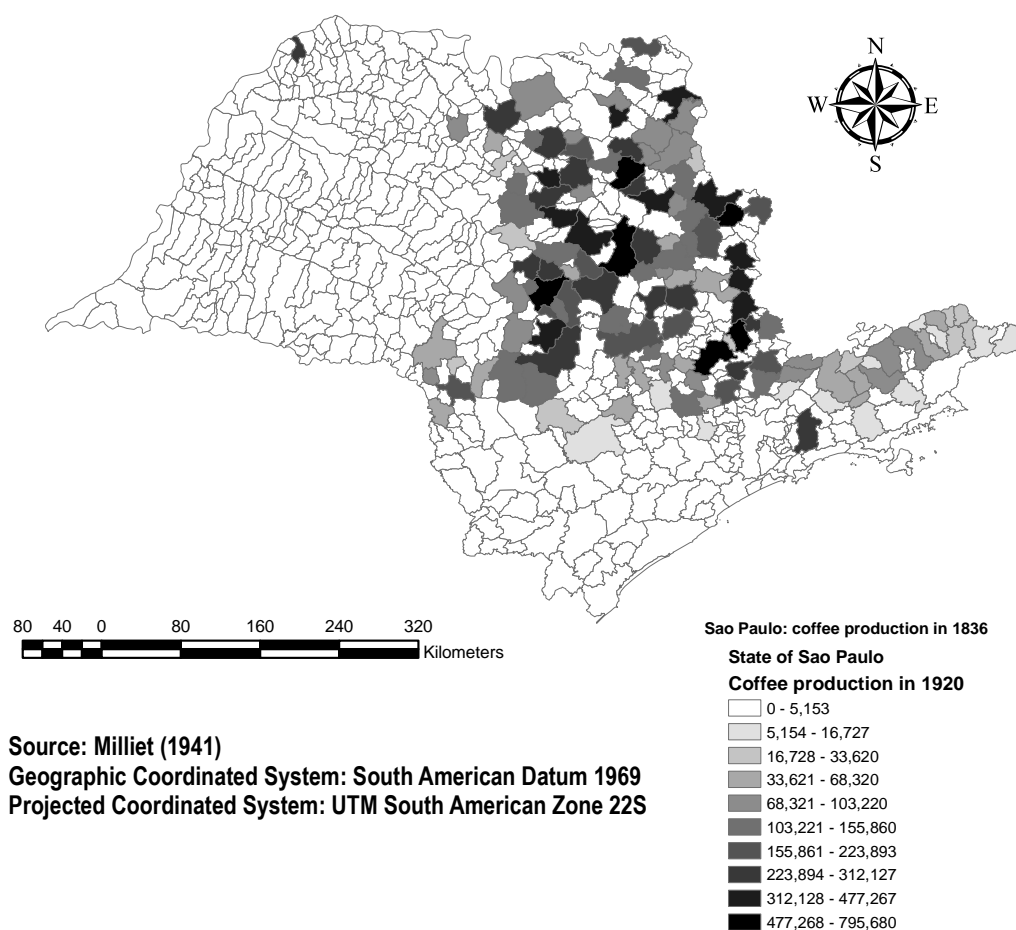
Sao Paulo: regional distribution of coffee production in 1886 (in arrobas)



* One arroba is equivalent to 15 kilograms (or 33 lbs.)

Figure 2.11 – Regional distribution of coffee production (1920), in arrobas*

Sao Paulo: regional distribution of coffee production in 1920 (in arrobas)



Source: Milliet (1941)

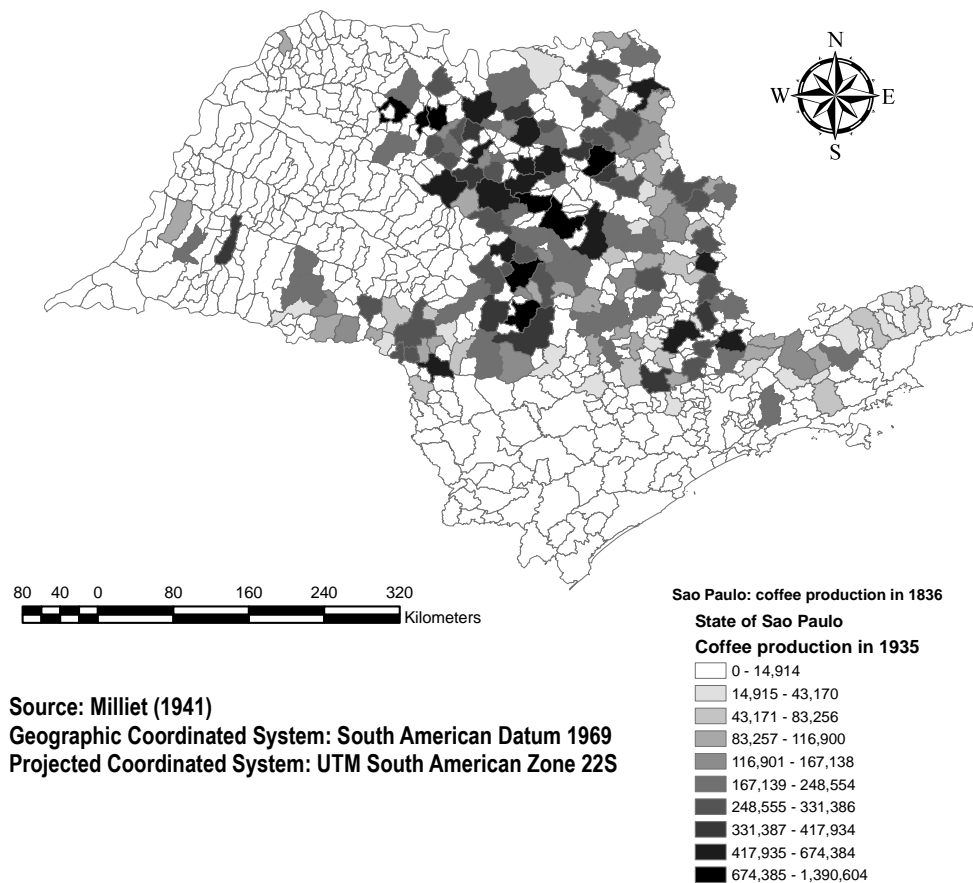
Geographic Coordinated System: South American Datum 1969

Projected Coordinated System: UTM South American Zone 22S

* One arroba is equivalent to 15 kilograms (or 33 lbs.)

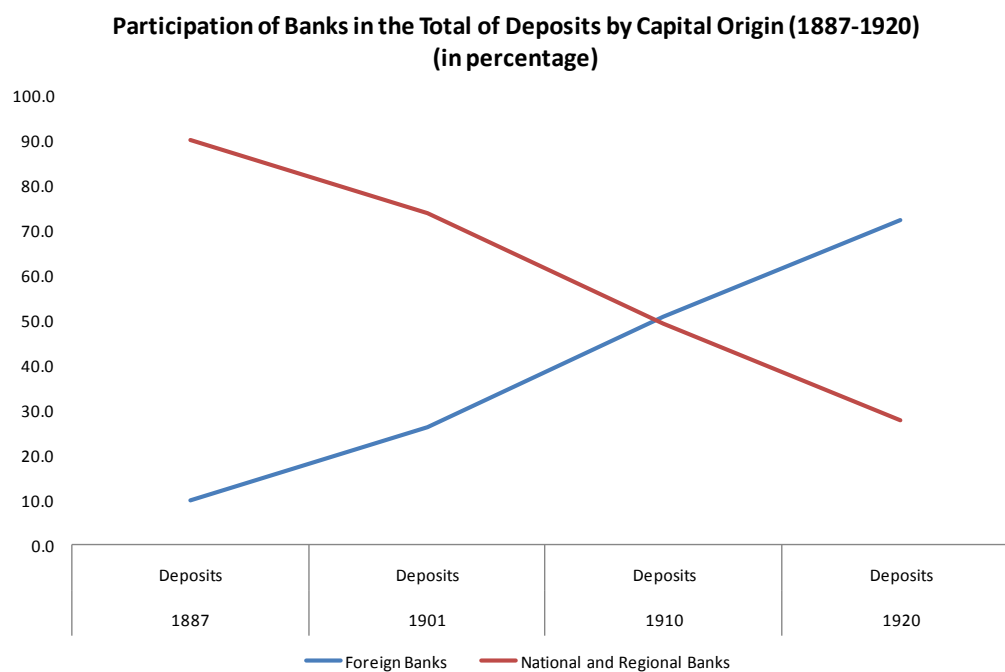
Figure 2.12 – Regional distribution of coffee production (1935), in arrobas*

Sao Paulo: regional distribution of coffee production in 1935 (in arrobas)



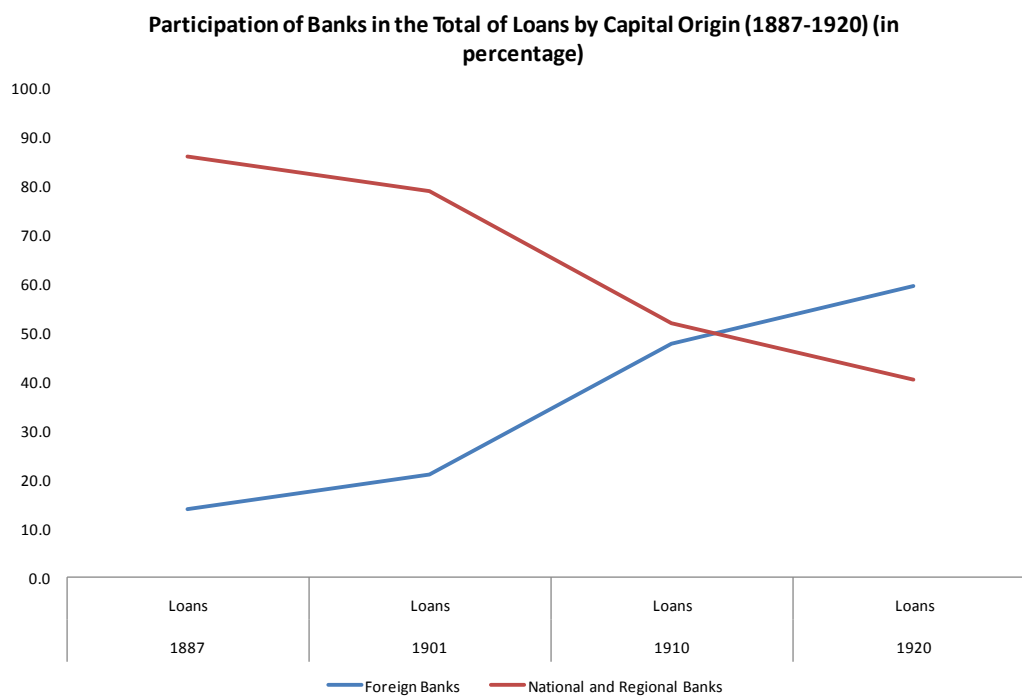
* One arroba is equivalent to 15 kilograms (or 33 lbs.)

Figure 2.13 – Participation of Banks in the Total of Deposits by Capital Origin (1887-1920) (in percentage)



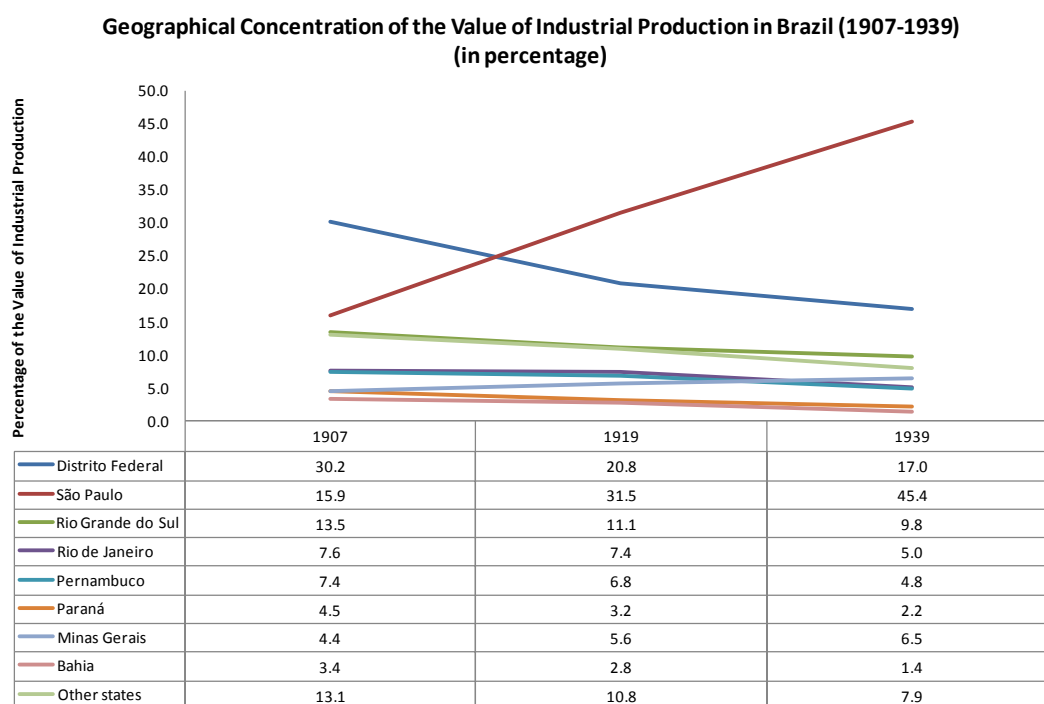
Source: Data extracted from Saes & Szmrecsanyi (1995)

Figure 2.14 – Participation of Banks in the Total of Loans by Capital Origin (1887-1920) (in percentage)



Source: Data extracted from Saes & Szmrecsanyi (1995)

Figure 2.15 – Geographical Concentration of Industrial Production in Brazil (1907-1939)



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), *Estatísticas do Século XX*. Cano (1981, p. 296). Author's elaboration.

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CHAPTER 3
RECENT METROPOLITAN DYNAMICS IN SÃO PAULO:
MANUFACTURING SECTORS AS MOTORS OF DEVELOPMENT
(2000-2005)

Introduction

This paper is aimed at a theoretical and empirical discussion on the socio-economic trajectories of metropolitan spaces. More specifically, I will concentrate on the metropolitan region of São Paulo (MRSP) as an object for detailed investigation.

In so doing, I will delve, on the one hand, into a critical analysis of “post-industrial” perspectives on metropolitan agglomerations. In this analytical model, the socio-economic structure and the contemporary historical paths of cities and metropolitan regions have been marginally influenced by the dynamics of manufacturing sectors (e.g. Sassen, 1998; Sassen, 2001; Short, 2004). Most of current urban research in São Paulo portrays the metropolis as a territorial configuration on the verge of a unambiguous functional transition from manufacturing to knowledge-intensive services as unchallenged carriers of economic growth (e.g. Meyer, Grostein, & Biderman, 2004; Biderman, 2004; Deák, 2004; Deák, 2009; Schiffer, 2004; Sassen, 1998; Abrahamson, 2004).

On the other hand, I will seek to empirically challenge the idea of “interiorization” of industrial development brought into light by prominent economists at the State University of Campinas (UNICAMP) (e.g. Cano, 1998; Pacheco, 1998; Negri, 1996). Proponents of that idea – which is akin to the concept of polarization reversal (e.g. Townroe & Keen, 1984; Richardson, 1980; Diniz, 1994) - assert that the rapid urban-industrial development of the

metropolitan region of São Paulo has brought into light an inevitable deterioration of the urban infrastructure as well as increasing costs of important factors of production, such as land and labor (e.g. Negri, 1996; Cano, 1998; Caiado, 2002). In light of decreasing returns to industrial investments in the metropolis, the regions in the countryside of São Paulo would emerge as alternative sites for location of manufacturing firms, thereby undermining – and eventually sweeping away - the traditional role of the MRSP as the main industrial space in Brazil (e.g. Caiado, 2002; Negri & Pacheco, 1994; Negri, 1996; Cano, 1998).

Albeit supported by dissimilar conceptual foundations, these two analytical perspectives lead to analogous empirical conclusions on the role of manufacturing sectors as motors of growth in the metropolitan São Paulo. As a corollary of these conceptual schemes, contemporary manufacturing development in the state of São Paulo has been conceived of as being a post-metropolitan phenomenon (cf. Meyer, Grostein, & Biderman, 2004; cf. Caiado, 2002; cf. Negri, 1996). Contrarily to what has been commonly argued (cf. Deák, 2009; cf. Marques & Torres, 2000; cf. Sassen, 1998; cf. Meyer, Grostein, & Biderman, 2004; cf. Negri, 1996), I beg to aver that manufacturing sectors are still motors of development in the metropolitan region of São Paulo.

To begin with, it is important to emphasize that the industrial development phenomenon in the state has been an intrinsically metropolitan venture (Lencioni, 2003; Matteo, 2007; Acca, 2006). As the empirical evidence shown in the subsequent sections of this paper will unveil, the movements of industrial relocation in the state of São Paulo have taken place around the city of São Paulo since the peak of industrial concentration in early seventies. The current patterns of industrial location in the state of São Paulo illustrate the

formation of an expanded metropolitan territory around the city of São Paulo, which is still the main center for manufacturing production in Brazil (see also Acca, 2006; Diniz & Campolina, 2007).

What we have recently witnessed in the metropolitan São Paulo, in line with the empirical results of this paper, is by no means a transition towards a post-industrial urban economy. To be sure, the metropolis is far from being a backward economic region when it comes to manufacturing production. I will seek to disentangle a regional economy, structured around the city of São Paulo, strongly oriented to complex manufacturing activity - such as telecommunications, biotechnology, chemicals, automotive industries, and avionics. Furthermore, entrepreneurial efforts of firms - empirically captured by estimated investments in Research and Development (R&D) - are also more intense in the expanded metropolitan region. Not surprisingly, the city of São Paulo and the immediate surrounding cities are one of the main territorial agglomerations for manufacturing-related R&D in the state of São Paulo and, by extension, in Brazil.

In light of what I have brought into light so far, it is possible to say that the concepts related to the service-oriented economy (e.g. deindustrialization, world city and global city) as well as to the “interiorization of industry” in São Paulo (e.g. polarization reversal) are incomplete and inconsistent explanatory canvases to depict the recent metropolitan socio-economic dynamics in São Paulo. For one thing, these concepts do not take into account the historical formation of the city of São Paulo; neither do they bring into light the complexity of the social relations that historically created a regional socio-economy oriented to manufacturing production over the course of the last century (Acca, 2006; Matteo, 2007; for classical accounts of those social

relations see Fernandes, Cardoso, & Ianni, 1976; Cardoso, 1969; Dean, 1969; Monbeig, [1952]1984).

Congruently with the strong historical orientation of the so-called Sociological School of São Paulo, I will embrace the idea that the movements of metropolitan formation and industrialization in São Paulo cannot be decoupled from the particular historical trajectories of capitalism in Brazil (e.g. Cardoso, 1965; Cardoso, 1969; Fernandes, Cardoso, & Ianni, 1976; Martins, 1973; Martins, 1979; Pereira, 1979).

Historically, industrial development in São Paulo was made possible by the emergence of an entrepreneurial class, whose germinal social orientation to more advanced capitalist practices paved the way for the Brazilian heavy industrialization in the twentieth century (Dean, 1969). The entrepreneurial function – i.e. the pushing through of new combinations in the economy (Schumpeter, 1934; Swedberg, 2009) - came into light as a class project with deep spatial impacts on the future paths of industrialization and regional formation in São Paulo (Cardoso, 1969; Fernandes, Cardoso, & Ianni, 1976).

Entrepreneurship, in that context, is a class project because prominent coffee planters in São Paulo – a relatively cohesive social group in the political as well as in the economic arenas (Reis, 1980; Love, 1980; Costa, 1989) - adopted more rational practices of management in their farms (Cano, 1981). For instance, coffee planters in the state favored the import of immigrant labor to be engaged in coffee production – as opposed to economic arrangements based on slave labor, which was a common practice over the course of the colonial economy as well as of the Empire (Costa, 1989; Stein, [1958]1985). Furthermore, the evolution of a more rational capitalist mentality among the coffee planters stimulated the creation of a specialized farm in opposition to the “old autarchic farms” that used to produce all their staples

based on exploitation of slave labor (for a brilliant description of the autarchic farm, see Freyre, 2001; Stein, [1958]1985). The social effects of that “new economic mentality” were the creation of incipient markets for labor and subsistence products as well as a light industrial sector to cater for the growing labor force in São Paulo (Cardoso, 1969; Furtado, 1977; Cano, 1981).

The industrial sector emerged in São Paulo as a result of a mentality oriented towards diversification of profits (Cardoso, 1969). Given the high productivity of coffee estates in the thriving Western regions of the state of São Paulo (Monbeig, [1952]1984), the most prominent coffee planters in the state sought to expand their sources of income by investing in other sectors of the economy – e.g. commercial activities as well as manufacturing (Mello, [1975]2009; Dean, 1969). A strong orientation to capitalist development marked the new spirit of the coffee exporters in São Paulo after the advent of the First Republic in Brazil – which endured from 1889 to 1930 (Dean, 1969; Cano, 1981; Mello, [1975]2009). Moreover, economic change leading to industrialization emerged within the political sphere. In their political discourses, the major planters in São Paulo emphasized the imperative necessity of political engagement as a way to transform the economy and the society through more development forms of capitalist accumulation (Casalecchi, 1987; Costa, 1989; Prado Jr., 1962). In this sense, capitalist development was seen by planters as a project of social transformation, and planters envisioned themselves as the main agents of social change in São Paulo – an idea that permeated the formation of the Republican Party in São Paulo in the late nineteenth century (Costa, 1989; Love, 1980; Casalecchi, 1987). As Reis (1985, p. 194-95) points out, the efforts of state-building in Brazil are guided by the interests of coffee exporters who “politicized the economy”, thereby using the state as an instrument of their own economic

interests – e.g. the immigration policy and the development of railroads in São Paulo was partially sponsored by the state instead of being a initiative carried out by isolated groups of entrepreneurs (Holloway, 1980; see also Reis, 1980; Love, 1980; Matos, 1973).

The development of the metropolitan region of São Paulo was made possible by the introduction of a capitalist mentality into the economic circuit by planters opening up as well as exploring the new coffee estates in the Western regions of the state (Cardoso, 1965, p. 43). On the one hand, the rationalization of coffee estates increased the productivity of the land through the implementation of professional management personnel as well as complex accounting systems to control the financial flows of the coffee capitalist enterprise (Cardoso, 1965; Cano, 1981). On the other hand, the rapid industrial expansion of the metropolis came into light as a consequence of the diversification of investments made by coffee planters in the thriving industrial sector of São Paulo in the dawn of the twentieth century (Dean, 1969; Cano, 1981; Mello, [1975]2009).

This new capitalist engine of accumulation was not only supported by the frenzied growth of the railroad system in São Paulo – which was a venture politically organized by coffee planters (Matos, 1973) – but also engendered by an immigration enterprise carried out by coffee planters in partnership with the state of São Paulo in the late nineteenth century and in the early years of the last century (Holloway, 1980).

Not only did the massive flow of European immigrants to São Paulo help to create a broader consumer market for industrial products but it also shaped a capitalist economic space set into motion by the capitalist practices of the new workforce: more positive attitudes towards work; a spirit of savings, which stimulated the emergence of the financial sector in São Paulo; an

entrepreneurial spirit - many immigrants left the new coffee lands of Western São Paulo to start up manufacturing shops in the city and other immigrants came from different regions of Europe seeking for business opportunities in the thriving economic space (Morse, 1970; Dean, 1969; Martins, 1973).

Important industrial conglomerates today came to the fore as a result of the immigrant entrepreneurial burst in São Paulo, such as Klabin, Votorantim and Villares (Dean, 1969; Marcovitch, 2005).

Summing up, the emergence of a “new industrial elite” in São Paulo, composed by coffee exporters who transferred their profits to manufacturing and immigrants who managed to start up their own small shops in the city, engendered seminal economies of agglomeration in the manufacturing sector which created a path-dependent trajectory with respect to manufacturing production; the emergence of a heavy industrial economy in subsequent years of the twentieth century rested on the interests of the industrial entrepreneurs in São Paulo in the twentieth century – thus reinforcing the deep-seated rooted knowledge advantages of the region over time (Storper, 1991).

These historical backdrops of the manufacturing sector in the state of São Paulo are still imprinted in the socio-economic arrangements of the metropolitan region today, thus influencing the reorganization of the region towards more knowledge-intensive manufacturing. Regional economies are stocks of relational assets, as Storper (1997) points out, in such a way that these historical and social elements in the formation of the metropolitan region of São Paulo cannot be ignored.

Henceforth, my analysis will focus on two fronts. First, I will critically delve into the main arguments related to the decline of manufacturing in the metropolitan region of São Paulo. As I have pointed out, I will challenge the idea that the most conspicuous movements of industrial development in São

Paulo take place outside the metropolis. To do so, I will delve into the main arguments of the global-city conceptual framework as well as the main ideas of the so-called Campinas School. Second, I will empirically unveil the territorial patterns of manufacturing production and entrepreneurial activities in the state of São Paulo, focusing on data related to industrial production (industrial value added as well as the value of industrial transformation) and entrepreneurial efforts undertaken by manufacturing firms in the state of São Paulo (measured by estimated R&D investments).

2. Neither Global City nor “Interiorized” Industrial Development

In light of “post-industrial” perspectives, urban and metropolitan spaces are indiscriminately visualized as dominant landscapes for capital accumulation boosted by the movements of financial capital in the global context (Taylor, 2007; Short, 2004; Sassen, 2001).

To conceptually challenge this idea, one of the central arguments pervading my analysis is as follows: not only does the “post-industrial” approach on urban and regional agglomerations entail a reified notion of space but it also reproduces an empirically flawed relationship between the global and the local, in which the only socio-economic nexus of the city, as a theoretical construction and analytical category, is its connection with the global capitalist circuit of accumulation (see e.g. Sassen, 1998; Sassen, 2001; Marques & Torres, 2000; Deák, 2004; Deák, 2009; Schiffer, 2004; Biderman, 2004; Meyer, Grostein, & Biderman, 2004).

As Jameson (1979, pp. 130-31) points out, some analysts of capitalism tend to reproduce concepts and ideas disconnected from their specific historical roots. Following Jameson’s paths, reified concepts are, by definition, abstract mental constructions decoupled from the specific meaning individuals and

social groups attach to the daily fabric of life. By extending Jameson's ideas to the sphere of urban and regional theory, I aver that, as they see the social world from these reified lenses, some urban and regional researchers cannot perceive what is qualitatively distinct about the tapestry of social relations in historically diverse socio-spatial contexts (Jameson, 1979, p. 131; see also Storper, 1997; Markusen, 1999; Gans, 2002). This is exactly the case when it comes to the acclaimed concept of global cities among most urban scholars: the historical formation of metropolitan spaces is ignored, and metropolitan regions are generally seen as nodes of command and control of global capitalist arrangements of accumulation (Sassen, 2001; Knox & Taylor, 1995; Beaverstock, 2007). Consequently, little or no consideration is given to the articulation of these "global" spaces with their national urban system; neither are these spaces seen as products of particular historical trajectories within the national states in which they are located (cf. Sassen, 2001; cf. Short, 2004; cf. Taylor, 2004; cf. Beaverstock, 2007).

As a reified mental construction, then, the idea of global cities – also called world cities in some analyses (e.g. Knox & Taylor, 1995; Taylor, 2004) – is a perfect example of a powerful abstract concept built in disjunction with the specific historical trajectories of cities and metropolitan regions (cf. Sassen, 1998; cf. Sassen, 2001; cf. Short, 2004; cf. Beaverstock, 2007; cf. Taylor, 2004).

In the same vein, Markusen (1999, pp. 874-76) cogently observes that the concept of global cities - as coined by Sassen (2001) and developed by prominent urban researchers (see e.g. Knox & Taylor, 1995; Taylor, 2004; Short, 2004; Beaverstock, 2007) – focuses on metropolitan agglomerations from the perspective of high-end producer services and the financial sector as an inevitable destiny of the economic development of cities insofar as they

embody knowledge-intensive activities performed by high-skilled individuals (e.g. Florida, 2008). For Markusen (1999, p. 874), this conceptualization is flawed because it is devoid of consistent empirical evidence with respect to the supposed prominent role of the service sectors in distinct and diverse metropolitan formations over the globe – manufacturing sectors, she goes on to say, still play an important role as generators of jobs and economic development in many places referred to as global cities. Moreover, Markusen (1999, p. 875) highlights the fact that global-city researchers focus on the existent commonalities among cities, thereby ignoring the role of national economies, national policies, and the role of the state in the making of urban structures of different countries – which might have a bigger impact on urban formation than the forces of globalization (see also Davis & Del Cerro, 2009; Davis, 2005; Ward, 2004; Acca, 2003).

By the same token, as Ward (2004, p. 153) argues, the concept of global city evokes “echoes of dependency theory” in the context of third-world metropolitan agglomerations. As a consequence, the socio-economic fate of metropolitan regions in developing countries – or the periphery, thus paraphrasing Cardoso & Faletto (1979) – is intrinsically connected to the dynamics of capitalist accumulation at the global level. Metropolitan regions, in this analytical perspective, are spaces of reproduction of the movements of capital accumulation which are strategically organized in core capitalist economies (cf. Sassen, 1998). Following this logic, urban scholars delving into metropolitan regions in third-world countries presuppose that the intensification of the global circuit of accumulation pushed through by major multinational firms headquartered in developed countries reshapes the socio-economic structure of cities in the global south (e.g. Sassen, 1998; Sassen, 2001; Segbers, 2007; Abrahamson, 2004). Metropolitan regions in developing

countries, as a result, have become strategic sites in the articulation of the global expansion of capitalism boosted by the frenzied growth of financial markets, the deregulation of national markets – creating more friendly environments for foreign direct investment as well as short-term speculative bets in peripheral financial markets, and the widespread presence of multinational firms across the globe (Friedman, 1995). According to Davis (2005), those traces of dependency theory in urban studies lead to a perspective on metropolitan regions that leaves room for an “analytic disarticulation of cities and nations because of the weight attributed to the structural dynamics of capitalism on a global scale, thereby providing further intellectual space for studying the relationship between cities and globalization, but bypassing the nation in the process” (Davis, 2005, p. 97; see also Ward, 2004; Markusen, 1999). An example of such a perspective can unequivocally be found in the work by Segbers (2007, p. 12): “(...) although most metropolitan regions of the developing world are not (yet) global nodes and command centers, they are home to increasingly globally oriented economic sectors and social groups, which are at least partially becoming or seeking to become detached from their past and their national fate. The metropolitan regions of the developing world thus are developing their own identities independent from the national level”. More specifically, urban scholars studying the recent dynamics of the metropolitan region of São Paulo take a similar approach by arguing that those forces associated to globalization have reshaped the socio-economic arrangement of the metropolis; consentaneously with the analytical angle advanced by the world-city approach, those scholars aver that the metropolitan region of São Paulo has undergone a functional transition from manufacturing to services as motors of economic development (e.g. Biderman, 2004; Schiffer, 2004; Meyer,

Grostein, & Biderman, 2004; Marques & Torres, 2000). Because the metropolis in São Paulo is seen as a node of articulation of the movements of global economy in the national space, contemporary urban research has become fascinated with the emergence of knowledge-intensive services (e.g. accounting, advertising and financial services) associated to the intensification of the flows of capital across the globe (e.g. Taylor, 2004); as a corollary of this analytical view, the national trajectories leading to recent transformations in the metropolitan region, particularly those related to the reorganization of the manufacturing sector in the metropolitan area, have been underexplored by recent urban and regional scholarship in Brazil³⁰.

Another major body of knowledge on the metropolitan region of São Paulo, albeit relying on distinct assumptions, also reinforces the idea that the metropolis is a declining industrial space. I call this strand of knowledge “Campinas School” because its main academic figures are associated with the Department of Economics at the State University of Campinas (UNICAMP) (e.g. Cano, 1998; Negri, 1996; Pacheco, 1998; Negri & Pacheco, 1994; Caiado, 2002).

According to this school of thought, the city of São Paulo – the metropolitan core – and its immediate outskirts have lost their manufacturing tradition. As a consequence, the historical manufacturing tradition of the metropolitan space has withered away in the wake of emerging new industrial agglomerations in the countryside of São Paulo as well as in other regions of Brazil. More specifically, the “Campinas School” stresses the emerging role of regions where industrial development is oriented to the exploitation of natural resources reinforced by the sectoral investments boosted by the II National

³⁰ For exceptions to this pattern, see Ferreira (2004), Matteo (2007), Diniz & Campolina (2007), Acca (2003), Acca (2006), Comin & Amitrano (2003).

Development Plan (II PND). The II PND was implemented in the mid-seventies and is taken by the “Campinas School” as a turning point in the reorganization of the economic space in Brazil (Negri & Pacheco, 1994; Pacheco, 1998; Cano, 1998; Caiado, 2002).

The proponents of the polarization reversal in São Paulo argue that the concerted efforts of the national and sub-national governments to promote decentralization of industrial development in Brazil have weakened the historically constructed economies of agglomeration in the metropolitan region of São Paulo (Pacheco, 1998; Diniz, 1994; Cano, 1998). Along these lines, Pacheco (1998, pp. 60-61) correctly argues that the strategic perspective of the state on regional development after the launch of the II National Development Plan (II PND) in 1974 changed the regional dynamics of capital accumulation in Brazil in two major ways: first, the industrial policy embodied in the II PND promoted substantial investments in natural-resource industries, agro-industries and basic industrial inputs related to the proximity of the sources of natural raw materials (e.g. iron, ore, aluminum, petrochemicals, paper and pulp), which were located outside the traditional urban-industrial space that had been created by past development paths around the city of São Paulo (Geiger & Davidovitch, 1986; Diniz, 1994); second, the regional development policies implemented under the auspices of the II PND favored the deconcentration of productive activities across the national territory through financial incentives to industrialization that were not available to economic ventures in the metropolitan region of São Paulo (Cano, 1998; Lessa, 1978; Mantega, 1997).

In other words, the spatial policy embedded in the II PND, set into motion during the Geisel administration (1974-1978), sought to promote regional development in the most remote areas of the country by reinforcing the idea

of national territorial integration and modernization (Pacheco, 1998; Cano, 1998). Because the II PND concentrated its investments in resource-based industries, the patterns of extreme industrial concentration in the metropolitan area of São Paulo - which had reached its peak in the early seventies (Acca, 2006) - were partially reversed in favor of federative units abundant in natural resources (e.g. Minas Gerais, Para, Bahia and Espirito Santo) (Cano, 1998; Caiado, 2002). It is also correct to point out, as the “Campinas School” does, that the uncontrolled as well as unplanned industrial growth of the metropolitan area in São Paulo until the early seventies created centrifugal economic forces in the urban-industrial area: the urban infrastructure became obsolete; the cost of important factors of production (e.g. land and labor) inhibited new investments in manufacturing as a result of environmental degradation (e.g. floods, air and water pollution) and deeper polarization between capital and labor – with the emergence of a powerful union movement in the city of São Paulo and in the adjacent industrial area of ABC (Santo Andre, Sao Bernardo do Campo, Sao Caetano do Sul and Diadema) (Negri, 1996; Cano, 1998, see also Geiger & Davidovitch, 1986; Storper, 1991)³¹.

Nonetheless, as I will empirically demonstrate over the course of this paper, the patterns of industrial deconcentration in the state of São Paulo are diverse in sectoral, technological as well as in regional terms – which is not generally captured by the “Campinas School”. More importantly, the movements of industrial location in the state of São Paulo take place within a radius of 150

³¹ More recently, the Campinas School has pointed out that the neo-liberal strategies implemented over the course of the nineties by Collor and Cardoso administrations – e.g. reduction of import tariffs, currency overvaluation and the curtailing of subsidies to manufacturing – contributed to the disarticulation of the metropolitan region as a major manufacturing space in Brazil (Caiado, 2002; see also Carneiro, 2002).

kilometers from the city of São Paulo – bringing into light a reorganization of the agglomerative forces in the expanding metropolitan area rather than the formation of new agglomeration economies in the countryside of the state (Azzoni, 1986; Acca, 2006; Matteo, 2007; Lencioni, 2003). As Fujita, Krugman, & Venables (1999, p. 9) observe, spatial patterns of location of economic activities are engendered by a balance between centrifugal and centripetal forces of agglomeration that act simultaneously within the boundaries of regional economies. Although the Campinas School eloquently describes the incidence of centrifugal forces in the metropolitan region of São Paulo (e.g. Negri, 1996; Cano, 1998), it ignores the fact that the city of São Paulo and its outskirts concentrate significant external economies (centripetal forces) when it comes to manufacturing production: e.g. a pool of qualified workers in the manufacturing sector, public and private R&D labs related to manufacturing sectors, dense flows of information emerging from face-to-face interaction between relevant economic actors, and complementarities with the service sector – which provides manufacturing with important knowledge inputs (Matteo, 2007; Acca, 2006). Not coincidentally, the movements of deconcentration in the state of São Paulo, as I will empirically demonstrate, have been more intense in branches of manufacturing which not only deploy less qualified inputs to production but also involve more standardized production processes – e.g. light consumer goods (such as clothing, shoes, food and beverages).

Given the limitations of the Campinas School as well as the global-city perspective to meaningfully comprehend the recent patterns of socio-economic development in the metropolitan region, I will pursue an alternative approach that integrates the historical specificities of regional formation in

São Paulo to the persistence of manufacturing sectors as important players in the dynamics of development in the city and its hinterlands.

On the one hand, as the empirical results of this paper will demonstrate, the deconcentration of the manufacturing value added in the state of São Paulo is stronger in low-tech as well as resource-intensive sectors – which are more connected to the export dynamics of Brazil (Pacheco, 1998; Caiado, 2002). This pattern not only reflects the impacts of the II PND on the spatial deconcentration of manufacturing in Brazil but also the efforts of the state government to decentralize economic development in São Paulo by investing in infrastructural improvement outside the metropolitan area (Caiado, 2002). As the map sets in the appendix of this paper shows, the presence of low-tech manufacturing sectors, such as agro-industries, outside the metropolitan area has substantially grown since 2000 (see Appendix). During the first five years of the last decade, then, the patterns of industrial dispersion in resource-intensive as well as low-tech sectors, which have been in place since the mid-eighties, were reinforced (Negri, 1996; Cano, 1998).

On the other hand, the socio-economic space organized around the city of São Paulo is far from being a site du jour for deindustrialization: as I will empirically illustrate, the strong presence of more complex manufacturing sectors in the metropolitan region poses conspicuous methodological problems for the analytical framework that envelops the global city perspective.

First, it is problematic to assume that urban regions are predominantly denationalized spaces oriented to capital accumulation at the global level (e.g. Sassen, 1998; Sassen, 2001); the global movements of the financial sector as well as the growing importance of knowledge-intensive sectors in the global scenario have produced fast-pacing transformations in the socio-economic

organization of the metropolitan region, although it is a partial explanation to the recent dynamics of the metropolitan region (Ferreira, 2007; Acca, 2006). Thus, it is imperative to emphasize that the spatial strategy of the Brazilian state after the introduction of the II PND, the neo-liberal wave of the nineties – which significantly reduced the import tariffs for many manufactured products – and the fierce local competition for the foreign direct investments made in the industrial sectors outside the metropolitan region undermined the old urban-industrial productive structure that emerged during the first seventy years of the last century (Matteo, 2007; Carneiro, 2002; Caiado, 2002; Acca, 2006). As I have pointed out elsewhere, the metropolitan region in São Paulo does not resemble the old urban-industrial space consolidated over the course of the “developmentalist” era: it is what I have termed a hybrid socio-economic space carved out not only by the global forces of capital accumulation but also by the spatial impacts of past development policies carried out by subsequent national and sub-national governments (Acca, 2003; Acca, 2006; see also Matteo, 2007; Geiger & Davidovitch, 1986; Storper, 1991).

Second, the theoretical perspective advanced by the global-city analytical vein involves a distorted scalar dimension insofar as it only focus on the relationship between the global trajectories of capitalism and their impacts on the destiny of urban agglomerations. Nevertheless, as Healey (2007) points out, an urban region might be conceived of as being a tapestry of social relations made of overlapping historical “layers” that coincide neither in their spatial configuration nor in its evolution over time. In urban regions, then, “different webs [of social relations] have different space-time of nodes and links. A place might be nodal in one relational web but peripheral in another” (Healey, 2007, p. 8). More concretely, in the metropolitan region of São Paulo,

these multiple historical layers that manufacture the fabric of urban life are evident. The circuit of capital accumulation related to the expansion of national as well as multinational banks and knowledge-oriented service firms is mainly located in the thriving Berrini-Faria Lima axis – a burgeoning business area in the southwestern region of the city of São Paulo (Ferreira, 2007; Fix, 2007). The metropolitan core, in this sense, concentrates the movements of the global economy at the local level – the spatiality of globalization in São Paulo takes place in the business areas of Avenida Paulista, the downtown area, and the so-called Southwestern vector (where the Berrini-Faria Lima axis is located) (Fix, 2001; Fix, 2007). On the other hand, the metropolitan region, including the city of São Paulo, is strongly oriented to manufacturing production as one of the chief motors of socio-economic development in the expanding urban space. The spatial organization of manufacturing in the metropolis, by contrast, is distinct from that of the service-oriented economy not only in terms of its regional configuration but also in terms of its historical roots.

With respect to the regional configuration of manufacturing production in São Paulo, early entrepreneurs in the state – among whom prominent coffee planters as well as industrial immigrants in the dawn of the twentieth century – took advantage of incipient economies of agglomeration along the routes carved out by railroads; railroads opened economic spaces where the main consumer markets for manufactured goods as well as a pool of qualified urban-industrial workers, mainly Europeans, were concentrated (Gunn & Correia, 2005; Dean, 1969).

As a consequence, the first strokes of a polycentric urban-industrial region around the city of São Paulo has emerged in the wake of the complementarities among the main urbanized areas in the state in the

beginning of the twentieth century – São Paulo, Santos, Jundiaí, Sorocaba and Campinas (Dean, 1969; Monbeig, [1953]2004).

Because of the industrial tradition of the metropolitan region of São Paulo, the most innovative firms in Brazil are located in the city of São Paulo and its immediate hinterland. Not coincidentally, the most knowledge-intensive manufacturing sectors are geographically concentrated in the expanded metropolitan area of São Paulo (Lemos, Moro, Domingues, & Ruiz, 2005; Matteo, 2007). Firms in this area have access to a qualified pool of manufacturing workers and to industrial knowledge produced by public and private research and development (R&D) labs. Moreover, firms located around the city of São Paulo have easy access to the main consumer markets in Brazil as well as to the most important transportation hubs in Brazil – e.g. the Port of Santos, the Guarulhos Airport and the Viracopos Airport, in Campinas, and the Rodoanel (the transportation belt connecting the expanded metropolitan region of São Paulo to the main roads in Brazil). Consequently, in light of external economies of agglomeration still enjoyed by manufacturing firms in the city of São Paulo and its outskirts, it is natural that technologically intensive firms are still located around the city. As I will show, the micro-region São Paulo – which includes the city of São Paulo and the traditional ABC region – augmented its share of the VTI and R&D in high-tech manufacturing sectors between 2000 and 2005.

The method I devised to scrutinize regional patterns of innovation in the state of São Paulo, based on an estimation technique of R&D activities will show that knowledge-intensive manufacturing is highly specialized in some regions of the state. High-tech R&D investments in the state of São Paulo are substantially concentrated in the so-called macro-metropolis, which has consolidated around the city of São Paulo (Matteo, 2007; Acca, 2006). This

indicates the formation of local economies of agglomeration in specific regions of the state based on knowledge and learning movements built through the interaction of socio-economic actors in the territorial economies that form the expanded metropolis in the state of São Paulo. Despite the relative decline of manufacturing in the city of São Paulo, the city itself is by far the most important industrial space in Brazil (Acca, 2006); furthermore, the decline of manufacturing, between 2000 and 2005, is more acute in low-tech sectors.

In that sense, the empirical results of this paper are consentaneous with the literature that stresses the role of diversity of the knowledge base in industrial sectors as an agglomerative advantage of cities (e.g. Jacobs, 1969; Marshall, [1890]1952). The presence of diverse economic sectors in large urban agglomerations fosters the transmission as well as diffusion of new knowledge through more constant interactions of economic agents (e.g. Duranton, 2009; Duranton & Puga, 2001; Storper & Venables, 2004); propinquity also facilitates the diffusion of tacit knowledge – i.e. industrial know-how that is not codified – across the local economic space (Gertler, 2004). As Marshall ([1890]1952, p. 271) points out, “when an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighborhood to one another. The mysteries of trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously”.

The socio-economic analysis of manufacturing sectors as motors of socio-economic dynamics in São Paulo can open up new avenues of analysis in regional planning, economic geography, and sociology; policy makers could also be benefited from being better equipped to understand the nature of the regional dynamics in São Paulo.

3. Manufacturing Sectors as Motors of Development in São Paulo: preliminary empirical dimensions

According to data provided by SEADE Foundation, the city of São Paulo accounted, in 2007, for 26.2% of the manufacturing Gross Domestic Product (GDP) in the state; in turn, the Metropolitan Region of São Paulo (MRSP) concentrated 49.1% of the GDP produced by manufacturing plants in the state São Paulo in the same year (SEADE, n.d.).

These data on manufacturing production in the city as well as in the metropolitan region of São Paulo by no means reflect a functional transition from manufacturing to services as carriers of economic development in the expanded urban region in the state. As I have pointed out, contemporary literature on metropolitan development in São Paulo fails to portray the historical specificities of spatial formation in São Paulo because this literature focuses on the linkages between the metropolis and the main global cities across the globe spurred by the expansion of capitalist at the global level (e.g. Marques & Torres, 2000; Schiffer, 2004; Meyer, Grostein, & Biderman, 2004; Taylor, 2004). In so doing, this literature focuses on the socio-economic commonalities between the metropolitan São Paulo and the major global cities in the world, thereby highlighting the emergence of a strong service sector oriented to catering for globalized firms operating locally – in this sense, São Paulo is analyzed as a nodal place in the articulation of the global strategies of capital accumulation with the local economic environment (Friedman, 1995; Marques & Torres, 2000; Schiffer, 2004). Nonetheless, this literature ignores two major aspects in the socio-economic arrangement of cities and metropolitan regions in developing countries. First and foremost, the globalization thesis tends to overlook both the impacts of national policies and specific political trajectories of countries on the fate of urban regions. For

Ward (2004, p. 153), the globalization thesis “denies the existence of important spatial, social, and political configurations which make for important geographical differentiation between one place and another” (see also Davis & Del Cerro, 2009). Second, given the strategies of transnational corporations with respect to the scope of their productive activities, metropolitan regions are connected to the global value-chain in different ways³². In this sense, metropolitan regions in developing countries tend to have a stronger manufacturing sector compared to that of the “global cities” in developed countries because of reallocation of manufacturing activities to underdeveloped countries (Dicken, 2007); more specifically, in the case of the metropolitan region of São Paulo, national as well as transnational firms take advantage of economies of agglomeration historically built around the metropolis, thereby reinforcing the role of manufacturing sectors as motors of development in the expanded metropolitan region³³.

³² In basic terms, a value-added chain is the functional organization of inputs (i.e. factors of production) in a given firm – or in an industrial chain - oriented to the maximization of profits (e.g. Kogut, 1985). The concept of global value-chain draws on that seminal perspective in order to understand *how* the movements of combination of productive factors (e.g. capital, labor, technology, basic and intermediate material inputs) undertaken by transnational corporations on a global scale affect the organization of productive activities internationally (Gereffi, Humphrey, & Sturgeon, 2005; see also Dicken, 2007). As a consequence, the impacts of globalization on the fate of metropolitan regions are diverse because the fragmentation of production at the global level and the relocation of manufacturing plants to developing countries that follows suit have spurred industrialization in the periphery of capitalism – led by manufacturing sectors seeking to take advantage of low-cost operations via “offshoring” (Gereffi, 2006; Dicken, 2007). According to Gereffi (2006, p. 4), “the same forces behind the impetus to shift production to low-cost regions within the United States eventually led US manufacturers to cross national borders to places such as Japan, Mexico and Singapore, and eventually to most of East Asia. Another major driver of industry relocation have been trade rules, which either tilted the balance for market access in favour of local production or reduced tariffs in outward processing trade (or production sharing) to the point where manufacturing offshore for the home market became highly attractive”.

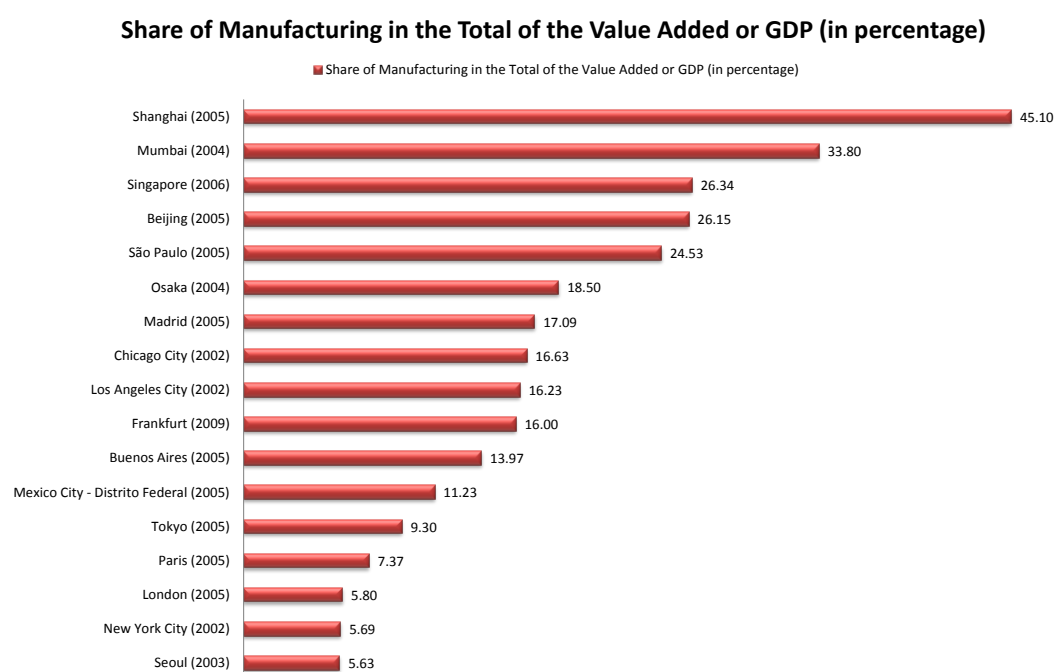
³³ For a distinct perspective on the impacts of globalization on the manufacturing sector in metropolitan agglomerations located in developing countries, see Krugman & Elizondo (1992). The authors argue that metropolitan agglomerations in developing countries tend to shrink as a result of trade openness and market deregulation. More specifically, Krugman & Elizondo (1992) aver that metropolitan agglomerations in developing economies emerge as a consequence of closed markets – e.g. high import barriers. Manufacturing firms, therefore, take advantage of economies of agglomeration in the “Third World Metropolis” since the main consumer markets as well as the main sources of industrial inputs are located in urban-industrial regions. In a context of open markets boosted by trade liberalization, Krugman & Elizondo (1992) argue that manufacturing sectors are less dependent on the domestic market in such a way that the economies of scale attained by metropolitan location of manufacturing activities become less important – thereby encouraging

As Figure 3.1 illustrates, the importance of manufacturing sectors to the economic structure of metropolitan regions across the globe is very diverse. On the one hand, first-order world cities - such as London, New York City, Tokyo and Paris (Taylor, 2004; Sassen, 2001), which serve as centers of command and control of global corporations, show strong signs of deindustrialization - i.e. a structural decline of manufacturing sectors as generators of jobs, income, knowledge and development (e.g. Bluestone & Harrison, 1982). These cities, to be sure, have experienced a functional transition from manufacturing to services as motors of economic growth in such a way that manufacturing accounts for a negligible proportion of the value added, GDP or the value of revenue in those cities (see Figure 3.1). On the other hand, it can be seen in Figure 3.1 that the “global-city” perspective cannot be generalized to some important urban regions located in developing countries. In some major urban formations in developing countries which are conceived of as being world cities, and post-industrial places by extension, manufacturing firms account for a considerable proportion of the value added, GDP or revenues (see Figure 3.1). For instance, manufacturing production accounts for 45.1% of GDP in Shanghai, 33.8% of GDP in Mumbai, and 24.5% of the GDP in São Paulo. Considering the fact that many service jobs are related to manufacturing activities in the wake of productive

decentralization of economic activities, and decline of manufacturing in metropolitan regions. Although the authors compellingly make their point by delving into the case of Mexico City – which has lost manufacturing firms to northern regions where “maquiladoras” are located (MacLachlan & Aguilar, 1998), the proximity of Mexico to the main consumer market in the world (the United States) poses problems to the empirical generalization of a relationship between trade liberalization and manufacturing decline in metropolitan regions. For instance, manufacturing sectors located in regions catering mainly for the local consumer market rather than being export platforms – e.g. São Paulo – still take advantage of what Hirschman (1958) once termed forward and backward linkages (access to inputs, markets and external economies) and are thus dependent on the economies of scale generated by metropolitan location of productive activities. Not coincidentally, manufacturing production accounted for 11.23% of the GDP in Mexico City, while manufacturing sectors in the city of São Paulo produced 24.53% of the GDP in 2005 (see Figure 1).

restructuring carried out by manufacturing firms (Miles & Boden, 2000; Tomlinson, 2001), those cities are far from being post-industrial sites anchored by knowledge-intensive service activities oriented to the global economy.

Figure 3.1 – Share of Manufacturing in the Total of the Value Added or GDP in Selected “World Cities” (2005, or latest available year) (in percentage)*



* Data for New York City, Los Angeles and Chicago refer to the Value of sales, shipments, receipts, revenue, or business done

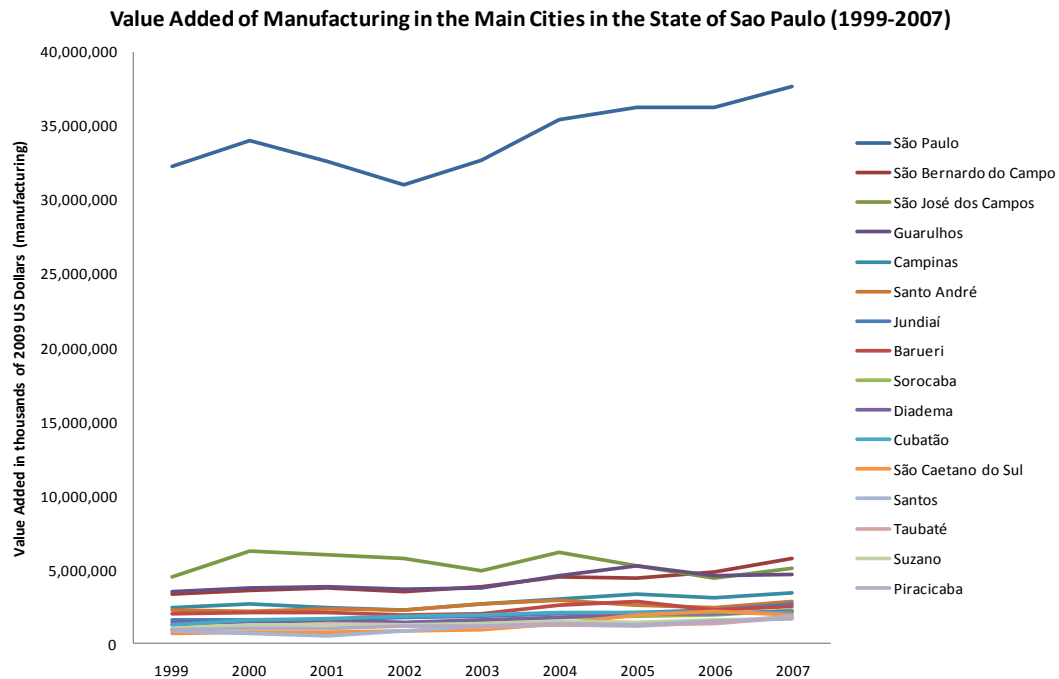
Source: Shanghai Municipal Statistics Bureau, *Shanghai Statistical Yearbook*. Beijing Municipal Bureau of Statistics, *Statistical Communique on the National Economic and Social Development of the City of Beijing in 2005 & the 10th Five-Year Plan Period*. The Urban Institute (2006), *Economic Growth of Mumbai Metropolitan Region* (Washington DC: The Urban Institute). Singapore Department of Statistics, *Gross Domestic Product by Industry*. Fundação Seade, *Produto Interno Bruto Municipal*. Osaka Prefectural Government, *Industry of Osaka* (<http://www.pref.osaka.jp/en/introduction/industry.html>). Instituto de Estadística de la Comunidad de Madrid, *Producto Interior Bruto Municipal de la Comunidad de Madrid*. U.S. Census Bureau, *2002 Economic Census*. City of Frankfurt am Main, *Statistical Yearbook* (http://www.frankfurt.de/sixcms/detail.php?id=3403901&_ffmpar_id_inhalt=3890772). Dirección General de Estadística y Censos (Ministerio de Hacienda GCBA). Instituto Nacional de Estadística y Geografía (INEGI), *Sistema de Cuentas Nacionales de México*. Bureau of General Affairs, *Gross Product in Tokyo-to Classified by Economic Activities (Fiscal Years 2004 and 2005)*. Institut National de la Statistique et des Études Économiques (INSEE), *Comptes régionaux annuels*. Office for National Statistics, *Regional Trends*. Statistics Korea, *Gross Regional Domestic Product (GRDP) in 2003*.

Moreover, recent data on industrial value added in the state of São Paulo show that the city of São Paulo does not resemble a post-industrial economic place. As can be seen in Figure 3.2, the gap between the city of São Paulo and the other main industrial cities in the state with respect to the value added of

manufacturing has broaden over the course of the last decade. Between 2001 and 2007, the city experienced industrial growth – which is at odds with the empirical patterns described in the literature on deindustrialization and sectoral transition in metropolitan regions (cf. Short, Benton, Luce, & Walton, 1997; cf. Bluestone & Harrison, 1982; cf. Sassen, 1998; cf. Sassen, 2001). To put it bluntly, a city on the verge of a sectoral transition from manufacturing to services as motors of economic development would not experience growth in the manufacturing value added (see Figure 3.2).

In addition to the recent growth of manufacturing in the city of São Paulo, Figure 3.2 shows that important industrial places around the city have also experienced substantial growth in manufacturing value added. For instance, the manufacturing sector in Sao Bernardo do Campo and Sao Caetano do Sul – which are consolidated industrial centers, mainly anchored by the motor industry – grew significantly between 1999 and 2007 (see Figure 3.2).

Figure 3.2 – Value Added of Manufacturing in the Main Cities in the State of São Paulo (1999-2007) (in thousands of 2009 US Dollars)



Source: SEADE (n.d.), *Informações dos Municípios Paulistas – IMP*

The geographical distribution of the industrial value added in São Paulo reveals that manufacturing production in the state is organized around the city of São Paulo. On the one hand, the city is still the main manufacturing production space in the state of São Paulo – and, by extension, in Brazil. On the other hand, it is crystalline in the Figures 3.3, 3.4 and 3.5 that the geographical expansion of manufacturing production in São Paulo is a metropolitan phenomenon, as Matteo (2007) and Lencioni (2003) have pointed out. More importantly, the following maps illustrate that the theories of global cities as well as the “Campinas School” – which makes the case for an alternative space for industrial production outside the metropolitan area – are limited conceptual tools to deal with the recent patterns of industrial development in the state of São Paulo (see Figure 3.3; Figure 3.4; Figure 3.5).

Figure 3.3 – Manufacturing Value Added in São Paulo (1999) (in thousands of 2009 US Dollars)

**Sao Paulo: geographical distribution of the Value Added (1999)
Manufacturing Sector (in thousands of 2009 US Dollars)**

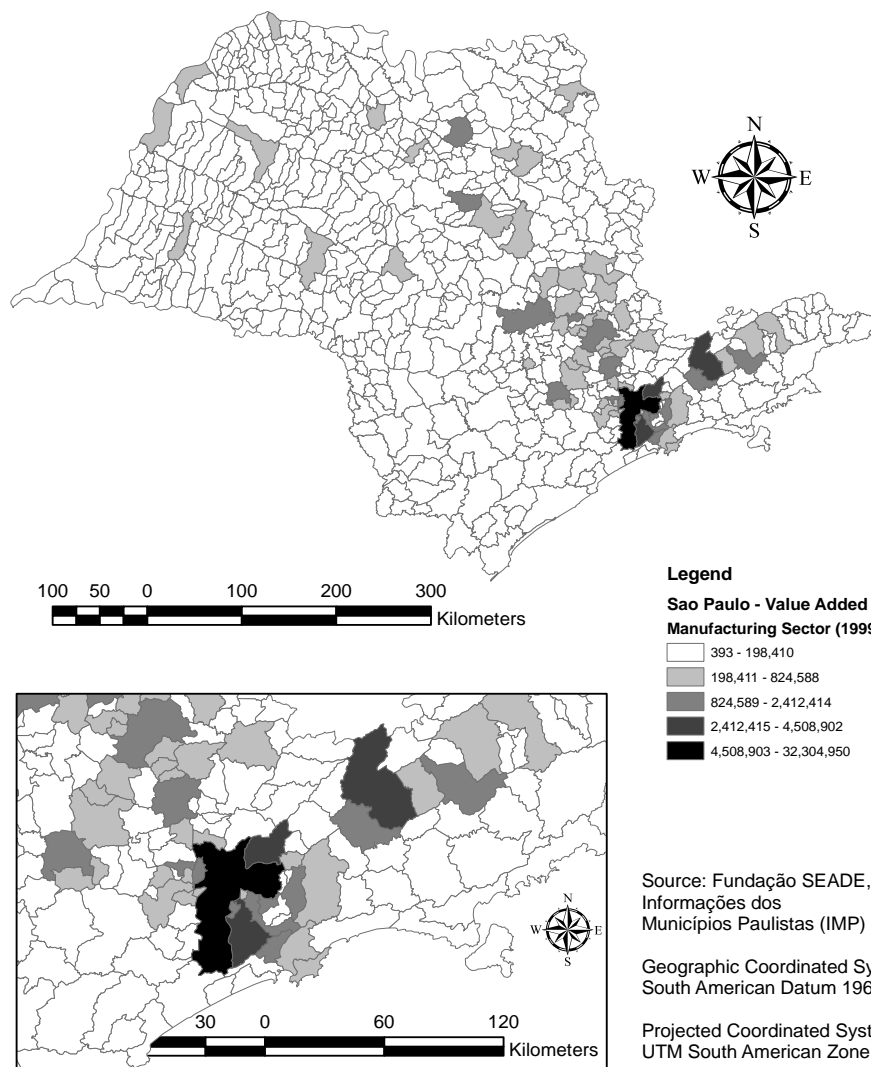


Figure 3.4 – Manufacturing Value Added in São Paulo (2003) (in thousands of 2009 US Dollars)

**Sao Paulo: geographical distribution of the Value Added (2003)
Manufacturing Sector (in thousands of 2009 US Dollars)**

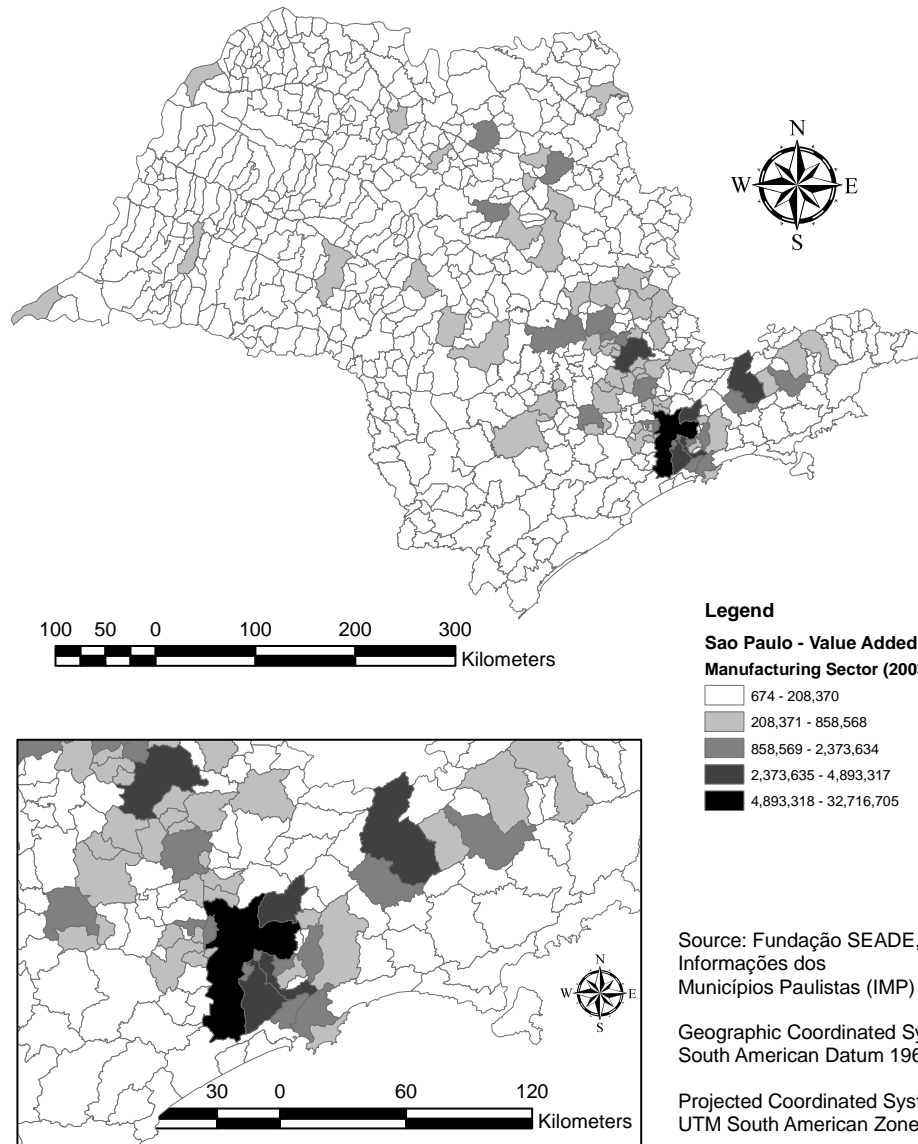
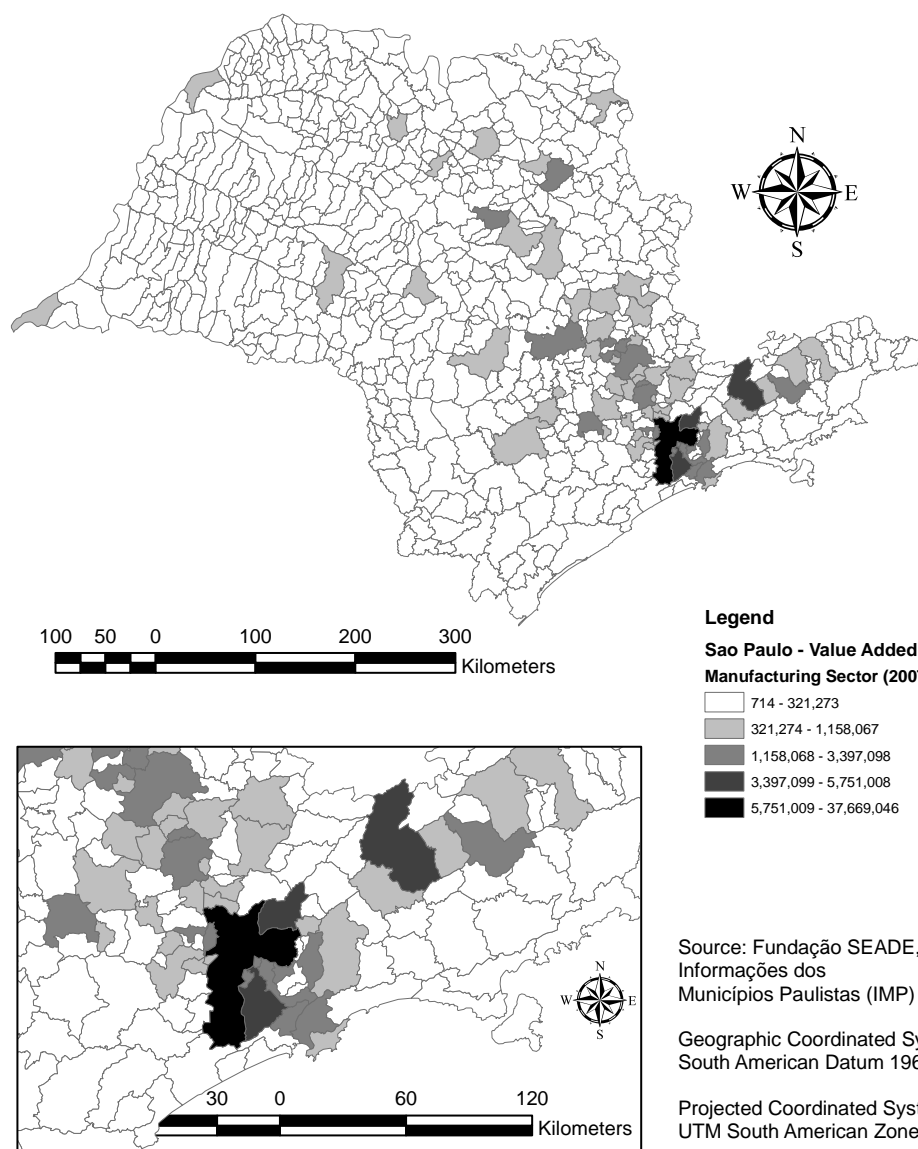


Figure 3.5 – Manufacturing Value Added in São Paulo (2007) (in thousands of 2009 US Dollars)

**Sao Paulo: geographical distribution of the Value Added (2007)
Manufacturing Sector (in thousands of 2009 US Dollars)**



As can be observed in Figure 3.6, which displays the regional dynamics of the Value of Industrial Transformation (VTI) in the state of São Paulo from 1970 to 2005, the territorial expansion of manufacturing activities in the state, despite its sectoral diversity, is basically materialized in regions around the city of São Paulo - mainly Jundiaí, Sorocaba, São José dos Campos, Campinas and Santos³⁴. Along these lines, between 1970 and 2005, the city of São Paulo has lost VTI to its immediate hinterland. Nonetheless, the city of São Paulo is still the industrial epicenter of an expanded production space. It is evident the process of industrial deconcentration in the state takes place around the metropolis, bringing into light an arrangement of productive complementarities among those regions (Acca, 2006; Diniz & Campolina, 2007; Lencioni, 2003). Taken together, the MRSP and the regions in the immediate metropolitan hinterland – the latter being comprised of the micro-regions located within a radius of 150 kilometers from the city of São Paulo – accounted for 85.2% of the VTI in the state of São Paulo (see Figure 3.6).

This pattern of expansion of manufacturing in the state confirms the hypothesis brought into light in mid-eighties by Azzoni (1986) and later developed by Storper (1991) and Diniz & Campolina (2007). According to Azzoni (1986), the reorganization of centripetal as well as centrifugal forces of agglomeration in the metropolitan area would lead to expansion of manufacturing location towards cities located within a radius of 150 kilometers around the city of São Paulo³⁵ (see Figure 3.6).

³⁴ The Value of Industrial Transformation (VTI) is a measure of value-added in manufacturing adopted by the IBGE. Basically, the VTI is the total value of industrial production subtracted by the total costs of industrial production (IBGE, n.d.).

³⁵ The expansion of manufacturing inside a radius of 150km from the city of São Paulo was anticipated by Azzoni (1986) and Storper (1991). However, in recent years, various authors have empirically complemented that hypothesis by introducing other agglomeration economies, such as the interdependence between services and manufacturing (Acca, 2006) and the technological intensity of firms located inside the expanded metropolis, which generates knowledge externalities in the main industrial space in Brazil (Diniz & Campolina, 2007).

Not coincidentally, the regional concentration of industrial production in the expanded metropolitan region, as Figure 3.6 shows, has not changed since 1970. Between 1970 and 2005, manufacturing location has migrated from the metropolitan core – mainly the city of São Paulo – to its immediate hinterland. Campinas and São José dos Campos were the main beneficiaries of the changing patterns of industrial location in the state (see Figure 3.6).

Figure 3.6 – Geographical Concentration of the Value of Industrial Transformation in São Paulo (1970-2005) (in percentage)

<i>Geographical concentration of VTI (in percentage)</i>								
	1970	1975	1980	1985	1996	2000	2003	2005
"Expanded" Metropolis								
<i>Metropolitan Region of Sao Paulo (MRSP)</i>								
SAO PAULO	60.7	60.5	52.1	44.1	39.4	30.2	26.5	26.9
GUARULHOS	2.6	3.7	3.7	4.6	2.4	4.6	4.4	4.2
OSASCO	2.4	2.3	3.0	3.4	3.6	3.1	3.0	3.5
MOJI DAS CRUZES	1.8	1.7	2.3	2.6	2.6	2.3	2.5	2.6
ITAPECERICA DA SERRA	0.5	0.8	1.4	1.6	2.2	1.7	1.5	2.0
FRANCO DA ROCHA	0.2	0.2	0.3	0.3	0.4	0.3	0.4	0.3
MRSP - Total	68.2	69.2	62.8	56.6	50.6	42.2	38.2	39.6
<i>Metropolitan Hinterland</i>								
CAMPINAS	4.4	8.3	8.3	9.7	9.7	14.9	15.4	15.6
SAO JOSE DOS CAMPOS	2.6	3.6	4.8	7.2	9.1	14.3	12.1	10.4
SOROCABA	1.8	1.9	3.0	3.3	3.8	4.1	4.8	4.8
SANTOS	2.7	2.3	3.5	4.3	1.8	3.5	4.0	4.4
JUNDIAI	1.9	2.1	2.3	2.0	1.6	2.9	2.9	3.1
PIRACICABA	0.8	1.3	1.5	1.3	1.2	1.3	1.9	2.0
LIMEIRA	1.4	1.3	1.4	1.4	1.8	1.4	2.2	2.6
MOJI-MIRIM	0.8	0.8	0.9	1.0	1.0	1.4	1.5	1.4
BRAGANCA PAULISTA	0.3	0.3	0.4	0.6	0.6	0.6	0.8	0.8
TATUI	0.1	0.1	0.3	0.3	0.3	0.5	0.6	0.6
Metropolitan Hinterland - Total	16.8	22.0	26.4	31.1	30.9	44.8	46.1	45.6
Expanded Metropolis - Total	85.0	91.2	89.2	87.7	81.5	87.0	84.3	85.2
Other Microregions - Total	15.0	8.8	10.8	12.3	18.5	13.0	15.7	14.8
State of Sao Paulo - Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Fundação Instituto Brasileiro de Geografia e Estatística (FIBGE), Censo Industrial 1970. Fundação Instituto Brasileiro de Geografia e Estatística (FIBGE), Censo Industrial 1975. Fundação Instituto Brasileiro de Geografia e Estatística (FIBGE), Censo Industrial 1980. Instituto Brasileiro de Geografia e Estatística (IBGE), Censos Econômicos 1985. Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Author's elaboration.

As Matteo (2007) points out, the intense urban-industrial growth around the city of São Paulo has given form to a “macro-metropolis” – beyond the administrative boundaries of the MRSP (see also Lencioni, 2003; Acca, 2006).

The socio-economic configuration emerging in the wake of the urban-regional restructuring in the state of São Paulo seem not to be related to the “post-industrial” analytical perspective - which purports the city of São Paulo as being the epicenter of a deindustrialization process (Sassen, 1998; Meyer, Grostein, & Biderman, 2004).

Along those lines, the historically built “entrepreneurial atmosphere” in the metropolitan region, which is strongly associated to manufacturing production and innovation, has sustained a pattern of industrialization that will not wither away in light of recent developments tied to globalization and the reinforcement of service industries it entails; in my view, such a perspective is largely ignored by recent works on the socioeconomics of development in São Paulo.

4. Entrepreneurship and Innovation

Entrepreneurship is far from reaching a conceptual consensus in the literature on the field. There is a myriad of distinct interpretations on the meaning of the concept of entrepreneurship as well as on its role in innovation. As a consequence, studies of entrepreneurial processes involve a plurality of theoretical lenses and empirical dimensions (Acs & Audretsch, 2005; Audretsch, Keilbach, & Lehmann, 2006; Swedberg, 2000; Gregoire, Noel, Dery, & Bechard, 2006; Ruef & Lounsbury, 2007).

Some authors, for instance, take the organizational dimension of the firm as a point of departure in order to set into motion the empirical perspectives that not only guide the theoretical production in the field but also the policies

oriented towards boosting entrepreneurial processes and technological innovation (Covin & Slevin, 1991; Zahra, 1991; Zahra, 1993; Zahra & Covin, 1995). From this perspective, entrepreneurial activities are related to organizational units of the firm dedicated to the exploitation and generation of new knowledge that can be commercialized in the form of goods and services (Fagerberg, 2005; Acs & Audretsch, 2005). Consistently with this analytical vein, entrepreneurial efforts might be identified in terms of Research and Development (R&D) investments made by firms, workers allocated in R&D activities, R&D laboratories, and patenting activities (Acs & Audretsch, 2005; Audretsch, Keilbach, & Lehmann, 2006; Smith, 2005).

According to Fagerberg (2005, p.5), the entrepreneur is the person or the organizational unit of the firm endowed with the capacity of exploiting the necessary factors in the organization of production in order to transform knowledge opportunities either into innovative processes or new products that can be commercialized in a competitive market (see also Shane & Venkataraman, 2000; Shane, 2003). To sum up, entrepreneurship, following this analytical standpoint, is the capacity of recognition and absorption of new knowledge, which is exploited inside the organizational structure of the firm (basically through R&D and patenting activities) and then transformed into new products commercialized in the market arena (Audretsch, Keilbach, & Lehmann, 2006; Fagerberg, 2005; Acs & Audretsch, 2005).

An alternative point of view, however, contends that entrepreneurial activities are not only undertaken by firms with market power and highly structured departments of R&D fuelled by heavy investments in innovative research. According to authors partaking to this analytical angle, entrepreneurship comes to the fore as firm startups. Thus, entrepreneurial efforts are basically characterized by the creation of new organizations –

generally small firms or small-firm alliances which seek to take advantage of knowledge externalities engendered by universities, research institutions, and big firms in order to develop new products inside those newborn organizational structures (Acs & Audretsch, 2005; Audretsch, Keilbach, & Lehmann, 2006; Saxenian, 1994). This strand of analysis is strongly inspired by recent works in economic geography that see knowledge flows as being limited to local economic configurations, in such a way that firms partaking in local arrangements of production are more prone to absorbing the knowledge generated by universities and local firms (see, e.g., Gertler, 2004; Malmberg & Maskell, 2002; Moulaert, 2000; Amin & Thrift, 1994)³⁶.

My approach to entrepreneurship is situated in an intermediate point between the two basic analytical perspectives synthetically explored above. Accordingly, the basic conceptualization that will guide the theoretical and empirical paths of my research refers to entrepreneurship as the search, absorption, and exploitation of new knowledge that will culminate in efforts oriented towards innovation, be it in terms of organization of production or in terms of development of new products, regardless of the size of the firm –

³⁶ Despite the influence of the literature on geographical proximity and innovation, some authors, in the field of economic geography, question the necessity of geographical proximity to the generation of innovation-intensive activities and learning processes (see, e.g., Amin & Cohendet, 2004; Torre & Rallet, 2005; Boschma, 2005). These authors argue that temporary mobility of actors involved in the processes of learning and innovation as well as the interaction facilitated by technologies of communication and information – which permit long-distance transmission of information and knowledge – engender an *organizational form* of proximity so face-to-face interaction becomes less important, even not required. As a corollary, actors who share the same organizational culture and values in an organization are able to generate innovation and knowledge at distance, so physical and geographical proximity is not a *sine qua non* condition for innovation (Amin & Cohendet, 2004). Despite the empirical validity of that approach, I argue that the reality of regional agglomerations show that physical and geographical proximity are still crucial to innovation and generation of new knowledge. Accordingly, these agglomerations show that innovation is built on institutional environments in which cooperation between firms, universities and the state is essential to the production of knowledge – e.g. public-private partnerships in the form of R&D laboratories either in universities or firms, research institutes, and other institutions oriented towards facilitating the flows of knowledge inside a regional agglomeration (Storper, 1997; Pike, Rodriguez-Pose, & Tomaney, 2006; Rutten & Boekema, 2007). Finally, data on industrial production come to the fore recently in different countries substantiate the argument that knowledge-intensive sectors are geographically concentrated (e.g. Storper, 1997; Acca, 2006; Diniz & Campolina, 2007).

or the size of the organization; in my view, entrepreneurship does not necessarily bring into light new firms or organizations, insofar as entrepreneurial processes might involve a recreation of modes of production inside long-established firms. Empirically, entrepreneurial processes can be observed in the following sets of data: a) implementation of R&D efforts; b) patenting activities; c) workers allocated in R&D activities; d) R&D laboratories; e) the export-oriented dynamics of the firm.

Certainly, the dynamics of entrepreneurship and innovation is variegated across sectors in light of some factors, such as the nature of knowledge in each industrial sector. First, some industrial chains, e.g. biotechnology, are more dependent on basic research carried out inside university laboratories and departments. Second, the technological stage of each sector is also an important factor because some sectors are more intensive in R&D in that they are in earlier stages of the innovation curve so as to reap more benefits – profits or “quasi-rents” – from the commercialization of technologically differentiated products. Third, the particular relationship of each industrial sector with the state and its development policies at local or national levels insofar as some sectors are more dependent on state subsidies and institutions oriented to supporting and financing production (Malerba, 2005; see also Oinas & Malecki, 2002).

As I argued elsewhere, empirical evidence on the regional dynamics of the Brazilian economy reveals that the expanded metropolis that has taken form around the city of São Paulo has consolidated as the main national production space with respect to innovation-intensive activities (Acca, 2006; see also Diniz & Campolina, 2007).

Taking the preliminary analysis carried out above as a point of departure, I argue that the study of the regional dynamics of entrepreneurship in São

Paulo has two important objectives: first, entrepreneurial processes lie at the core of technological innovation implemented by industrial firms in São Paulo; second, understanding the mechanisms of entrepreneurship in São Paulo paves the way for development policies more compatible with the new reality of manufacturing in Brazil; in other words, an industrial policy oriented towards building an institutional environment that stimulate innovation should better comprehend the role of entrepreneurial agents in boosting innovation. Insofar as this entrepreneurial and innovative dynamics is more intense in the expanded metropolis in the state of São Paulo, I will depart from this regional socio-economic configuration to study the relationship between entrepreneurship and innovation.

Henceforth, I will explore the recent patterns of regional development in São Paulo, whereby bringing into light data on manufacturing production and innovation.

5. Data, Methodological Procedures and Research Methods

One of the most striking shortcomings of research on urban and regional development in Brazil is the absence of reliable data on local and regional patterns of innovation. As a consequence, most of the analyses are based on precarious empirical findings in so far as there are no surveys of technological activity at the sub-national level in Brazil. For example, the most advanced survey on industrial innovation in Brazil is the Survey on Industrial Innovation (PINTEC), carried out by IBGE in 2000, 2003, and 2005. Even though the survey is undertaken by very competent researchers at the institute, it is very aggregate in terms of its regional units of analysis, the most basic of which is the state (the Brazilian Federal Units). Therefore, there is no room for researchers, policy makers, and urban and regional planners

interested in tackling technological evolution and specialization at the regional level. Neither is it possible to marshal evidence on the relationship between regions and their specific technological trends – e.g. in São Paulo, the state and the metropolitan region are rather diversified with respect to their technological production as well as sectoral investments in learning and innovation.

Because there are no data on those investments at the regional level, any systematic attempt at studying regional agglomerations from the perspective of knowledge formation and learning ends up being either too vague or too formulaic (e.g. Diniz & Campolina, 2007; Lemos, Moro, Domingues, & Ruiz, 2005). The bulk of literature on regional and local “systems of innovation” in Brazil does not offer any consistent data on technological investments made by firms at the regional level (see, e.g. Cassiolato, Lastres, & Maciel, 2003; Lemos, Moro, Domingues, & Ruiz, 2005).

For instance, in São Paulo, the most recent study on technological development was a survey produced by SEADE Foundation – a research institute funded by the state government. Surprisingly, there is no data on investments in innovation at the regional level. The data on innovation in the state of São Paulo is limited to the number of workers dedicated to R&D activities as well as the availability of R&D labs; however, the regional units of analysis are the Administrative Regions of the state, which hampers analytical efforts at the regional level in that they are territorially ample and socio-economically diverse leading us astray from regional patterns of sectoral and technological specialization.

In addition to these methodological limitations, which generally emerge as a result of limited financial resources to carry out economic surveys, the last economic survey in São Paulo was conducted in 2001 by SEADE

Foundation. Despite the fact this survey can be a very good instrument for policy analysis, there are three major shortcomings as regards its usefulness as a regional and technological development trends in São Paulo. Firstly, as I said before, the survey is very aggregate in terms of its regional units of analysis hampering a more detailed portrait of industrial and technological patterns of specialization at more disaggregated regional levels. Secondly, the survey does not provide any data on investments in R&D, which is at odds with more advanced methodologies devised internationally to deal with technological measures at the regional level (OECD, 2002; Polenske, 2007; Pike, Rodriguez-Pose, & Tomaney, 2006); as a consequence, international or cross-regional comparisons are unfeasible. Thirdly, insofar as the survey was only carried in 2001, any chronological pattern of technological change at the regional level is impossible to be drawn.

Outside São Paulo, the picture is bleaker. Regional surveys on technological investments are inexistent. The only technological survey available nationally is the PINTEC by IBGE, and, as I said earlier, it is not possible to accomplish any regional analysis on technology from that survey because the most disaggregated geographical unit is the state – e.g. only the state of São Paulo has 64 micro-regions and 645 municipalities.

Given those limitations, the Brazilian scholarship on technological policies at the regional level is empirically weak and theoretically vague since it resorts to theories brought into light to deal with totally different social and historical realities. Empirically, in most of the cases, regional innovation is conveyed either with data on industrial production or proxies derived from data on industrial production as well as patenting activities, which, as I will discuss later, are clearly inconsistent empirical measures of regional innovation (cf.

Diniz & Campolina, 2007; cf. Lemos, Moro, Domingues, Ruiz, 2005; cf. Gonçalves, 2007; cf. Cassiolato, Lastres, & Maciel, 2003).

Seeking to overcome the methodological problems I have exposed so far, I devised a methodology to estimate R&D investments made by manufacturing firms in the 64 micro-regions of the state of São Paulo. Also, R&D investments can be broken down into every manufacturing sector at two-digit CNAE, which stands for the Brazilian Industrial Classification (CNAE), in those 64 micro-regions of the state.

Henceforth I will disentangle the empirical and methodological procedures that made such an endeavor possible.

5.1. Industrial and Technological Classifications

Data on the Value of Industrial Transformation (VTI) were provided by IBGE at the two-digit sectoral level, following the National Classification of Economic Activities (CNAE) (see Figure 3.7)³⁷. The Brazilian industrial classification follows the International Standard Industrial Classification (ISIC) of the United Nations Statistics Division (UNSTATS, n.d.).

³⁷ Data on the CNAE 245 industrial classification were estimated by applying the share of that sector in the value added database of SEADE to the VTI database provided by IBGE. On the other hand, data on the CNAE 353 were estimated by assuming that the micro-region São José dos Campos produce 100% of the VTI in that sector – which was a logical step since EMBRAER is located in São José dos Campos, and it is the only avionics producer in Brazil. Furthermore, 95% of the workers in that sector are located in São José dos Campos, according to the Annual Survey on Workers (RAIS) (RAIS, n.d.).

Figure 3.7 – Classification of Manufacturing Sectors According to the National Classification of Economic Activities (CNAE)

Description of Industrial Sectors	Classification (CNAE)
Manufacture of food products and beverages	15
Manufacture of tobacco products	16
Manufacture of textiles	17
Manufacture of wearing apparel; dressing and dyeing of fur	18
Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness and footwear	19
Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	20
Manufacture of paper and paper products	21
Publishing, printing and reproduction of recorded media	22
Manufacture of coke, refined petroleum products and nuclear fuel	23
Manufacture of chemicals and chemical products	24
Manufacture of pharmaceuticals, medicinal chemicals and botanical products	24.5 (1)
Manufacture of rubber and plastics products	25
Manufacture of other non-metallic mineral products	26
Manufacture of basic metals	27
Manufacture of fabricated metal products, except machinery and equipment	28
Manufacture of machinery and equipment n.e.c.	29
Manufacture of office, accounting and computing machinery	30
Manufacture of electrical machinery and apparatus n.e.c.	31
Manufacture of radio, television and communication equipment and apparatus	32
Manufacture of medical, precision and optical instruments, watches and clocks	33
Manufacture of motor vehicles, trailers and semi-trailers	34
Manufacture of other transport equipment	35
Manufacture of aircraft and spacecraft	35.3 (2)
Manufacture of furniture; manufacturing n.e.c.	36

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).

(1) Estimated data

(2) Estimated data

In order to classify industrial sectors according to their technological intensity, I followed the methodological procedures recommended by the Organization for Economic Co-operation and Development (OECD, 2007, p. 220) (see Figure 3.8).

Figure 3.8 – Classification of Manufacturing Sectors According to their Technological Intensity (International Standard Industrial Classification, ISIC; National Classification of Economic Activities, CNAE)

<i>Technological Intensity</i>	<i>Industrial Classification</i>
High-Tech Industries	
Aircraft and Spacecraft	ISIC 353, CNAE 353
Pharmaceuticals	ISIC 2423, CNAE 245
Office, accounting and computing machinery	ISIC 30, CNAE 30
Radio, TV and communications equipment	ISIC 32, CNAE 32
Medical, precision and optical instruments	ISIC 33, CNAE 33
Medium-High-Tech Industries	
Electrical machinery and apparatus	ISIC 31, CNAE 31
Motor vehicles, trailers and semi-trailers	ISIC 34, CNAE 34
Chemicals (excluding pharmaceuticals)	ISIC 24 (exc. 2423), CNAE 24 (exc. 245)
Transport equipment (railroad, boats, ships, motorcycles)	ISIC 35 (exc. 353), CNAE 35 (exc. 353)
Machinery and equipment	ISIC 29, CNAE 29
Medium-Low-Tech Industries	
Rubber and plastics products	ISIC 25, CNAE 25
Coke, refined petroleum products and nuclear fuel	ISIC 23, CNAE 23
Other non-metallic and mineral products	ISIC 26, CNAE 26
Basic metals and fabricated metal products	ISIC 27-28, CNAE 27-28
Low-Tech Industries	
Manufacture of furniture and other manufacturing	ISIC 36, CNAE 36
Wood, pulp, paper, paper products, printing and publishing	ISIC 20-22, CNAE 20-22
Food products and beverages (exc. Tobacco)	ISIC 15, CNAE 15
Textiles, textile products, leather and footwear	ISIC 17-19, CNAE 17-19

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa de Inovação Tecnológica (PINTEC).

Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).

Organization for Economic Co-Operation and Development (OECD), *OECD Science, Technology and Industry Scoreboard 2007*

Author's elaboration.

The only difference between the industrial classification in Figure 3.8 and that elaborated by the OECD (2007, p. 220) is related to the CNAE/ISIC 35. It was not possible to estimate the values of VTI and R&D in ISIC/CNAE sectors 351, 352 and 359. In light of this minor methodological problem, I assigned data on the CNAE/ISIC 35 (excluding CNAE/ISIC 353) to the

medium-high tech industries – in the OECD classification, sector 351 should be assigned to the medium-low tech industries (cf. OECD, 2007, p. 220).

5.2. Research and Development (R&D) Activities, Entrepreneurship and Innovation

One might ask: what is the relationship between entrepreneurship and technology? What is the relationship between entrepreneurship and innovation? And how could we empirically grasp those relationships?

As Schumpeter points out, capitalist development is intrinsically related to technological change – or continuous innovations embodied in products and their productive means (Schumpeter, 1934, p. 66; see also Schumpeter, 1942, pp. 82-83)³⁸. Accordingly, Schumpeter defines development as “the carrying out of new combinations” in already available productive means (Schumpeter, 1934, p. 66-68; see also Swedberg, 2000; Fagerberg, 2003).

In his classic statement on innovation, which he calls “development”, Schumpeter (1934, p. 66) avers that are five the main cases through which these new combinations come to the fore, which are as follows: 1) the introduction of a new good; 2) the introduction of a new method of production; 3) the opening of a new market; 4) the conquest of a new source of supply of raw materials or half-manufactured goods; 5) the carrying out a new organization. Schumpeter (1942, p. 83) later argues that these new combinations are the essence of capitalist change. As he says, “the fundamental impulse that sets and keeps the capitalist engine in motion comes from the new consumers’ goods, the new methods of production or transportation, the new markets, the new forms of industrial organization that capitalist enterprise creates” (Schumpeter, 1942, p. 82).

³⁸ Following Fagerberg, it must be said that the first Schumpeterian definition of innovation, which was seen “as ‘new combinations’ of existing resources, equipment and so on” (Fagerberg 2003, p. 131), was termed “development” (see Schumpeter [1934], chapter II, p. 66).

In this context, entrepreneurship emerges as a specific social activity that can be conceived of as being the capacity of individuals and organizations to put together already existing means of production (raw materials, resources, equipment, etc.) to the service of new (and marketable) productive combinations (Schumpeter, 1934; Schumpeter, 1942; Schumpeter, 1989; see also Fagerberg, 2003). To draw on Swedberg's insightful analysis, entrepreneurship is innovation in the making oriented to bringing into light new products to the market (Schumpeter, 1934; Schumpeter, 1942; see also Swedberg, 2000; Fagerberg, 2003). As Schumpeter puts it, "the function of entrepreneurs is to reform or revolutionize the pattern of production by exploiting an invention or, more generally, an untried technological possibility for producing a new commodity or producing an old one in a new way, by opening up a new source of supply of materials or a new outlet for products, by reorganizing an industry and so on" (Schumpeter, 1942, p. 132)³⁹.

Painting on Schumpeterian canvases, I contend that R&D activities at the regional level are the most appropriate empirical data on the relationship between entrepreneurship and innovation. First and foremost, R&D activities involve the search for new goods and new production processes to put these goods in the market. Therefore, R&D activities are related to the generation

³⁹ It is beyond the scope of this research project to analyze the vicissitudes of Schumpeter's perspectives on entrepreneurship, which are frequently portrayed as "Schumpeter Mark I" and "Schumpeter Mark II" (Fagerberg, 2003; Freeman & Soete, 1997). For example, the decadence of the entrepreneurial function is a very important topic in Schumpeter's work because it lies at the core of its theory of capitalism (see Schumpeter 1942). According to Schumpeter (1942, p. 132) innovation would be "reduced to routine", and this social activity would be performed by "teams of specialists" instead of being an endowment of a special class of individuals. Another important theme in Schumpeter's approach to entrepreneurship is the Schumpeterian analytical transition from the entrepreneur as an individual to the entrepreneur as a collective agent – e.g. a firm, where the entrepreneurial function is performed co-operatively (Schumpeter, 1989; see also Fagerberg, 2003; Swedberg, 2000). It must be noted that this collective perspective is largely ignored by the literature on entrepreneurship, probably because the focus of entrepreneurship as a discipline in business schools and economics is on new firm startups. Frequently this literature associates the meaning of entrepreneurship more strongly to new firm startups (e.g. Gregoire, Noel, Dery, & Bechard, 2006; Audretsch, Keilbach, & Lehmann, 2006).

of new economic knowledge that is exploited through social interaction between agents engaged in producing new technologies (Freeman & Soete, 1997; Acs & Audretsch, 2005; Smith, 2005). The intensity of R&D undertaken by firms, public institutions, industrial sectors and regions reflects a social product of the efforts dedicated to “the carrying out of new combinations”, as Schumpeter (1934, p. 66) says, in the form of innovative products and production arrangements. As Freeman & Soete (1997, p. 5) highlight, “there is ample justification for concentrating attention on the flow of new scientific ideas, inventions and innovations. Efforts to generate discoveries and inventions have been increasingly centered in specialized institutions (...) this professionalized system is generally known by its abbreviated initials R&D. Its growth was perhaps the most important social and economic change in twentieth-century industry”.

Although R&D activities are arguably the most accurate empirical data to depict innovation efforts by economic agents (firms, industrial sectors, public institutions, and so on), there are some methodological problems with respect to the use of R&D activities as a proxy of technological innovation. It is clear that innovations coming from R&D activities do not represent the whole amount of innovations performed by economic agents.

On the one hand, a lot of innovative efforts are carried out outside formal labs or without formal R&D budgets, and thus cannot be captured by any “traditional” empirical measure, such as R&D expenditures and employees involved in R&D activities (Acs & Audretsch, 2005, p. 57). On the other hand, in some cases, R&D efforts are mobilized aiming at technological adaptations rather than technological innovations – e.g. this kind of R&D is generally adopted when firms seek to adapt to local conditions of production by changing the composition and the disposition of equipment in the plant as

well as by changing the final product in order to cater for the local consumers (Amsden, Tschang, & Goto, 2001; Amsden & Tschang, 2003; Gomes, 2006; Queiroz & Carvalho, 2005; FAPESP, 2010)⁴⁰.

At any rate, R&D, I argue, is a central empirical measure as regards the entrepreneurial efforts undertaken by firms to bring into light innovative products by recombining the already existing productive means at hand. The entrepreneurial function, as I have pointed out, not only emerges from new products and modes of organizing the productive circuit; as Schumpeter ([1911]2003) argues, the entrepreneurial act is a recombinant endeavor. Although adaptive R&D is not oriented to the generation of new knowledge, it is a recombinant endeavor in the sense that endogenous knowledge is mobilized to adapt productive equipment and products to the context in which they are taken to the market (Amsden & Tschang, 2003; Queiroz & Carvalho, 2005; FAPESP, 2010).

Even firms in technology-taker countries, such as Brazil, carry out adaptive R&D activities seeking to develop new products in the context of national markets by mobilizing endogenous resources (knowledge, skills, institutional arrangements, and so on) in such a way that, in the wake of technological diffusion, incremental innovations pave the way to new products to be commercialized in the national market (Fagerberg, 2005).

In that sense, as Fagerberg (2005, p. 8) points out, entrepreneurship has to be historically contextualized so as to provide an explanatory framework for countries that are not cutting-edge technological producers. As the author

⁴⁰ As Queiroz & Carvalho (2005) empirically show, there is a considerable presence of multinational enterprises in the activities of R&D in Brazil. Consequently, the R&D activities undertaken by multinational firms are more related to the *adaptation* of their products to the national market (e.g. the automotive industry) than oriented to the generation of new products emerging from basic scientific research (see also FAPESP, 2010).

makes the case for, “there is also the question of how to take different contexts into account. If A for the first time introduces a particular innovation in one context, while B later introduces the same innovation in another, would we characterize both as innovators? This is a matter of convention (...) following Schumpeter’s own definition, it would be equally consistent to call B an innovator as well, since B is introducing the innovation for the first time in a new context (...) Introducing something in a new context often implies considerable adaptation (and, hence, incremental innovation) and, as history has shown, organizational changes (or innovations) that may significantly increase productivity and competitiveness” (Fagerberg, 2005, p. 8; see also Amsden, Tschang, & Goto, 2001).

Along these lines, I contend that R&D efforts undertaken by firms are superior to patenting activities as an empirical indicator of regional search for new products and new methods of production, which is lies at the core of the entrepreneurial function (Schumpeter, 1934). Although patenting activities also reflect a search for new products and productive methods, there are some clear limitations as for taking patent counts as a proxy of innovation.

Patents are, in the first instance, inventions and thus they do not have per se a positive economic value before the knowledge they embody is commercialized in the market in the form of new goods and services (Freeman & Soete, 1997; Acs & Audretsch, 2005; Kuznets, 1962). Consequently, patent indicators have a heterogeneous nature, as Archibugi (1992, pp. 359-360) correctly observes: “(...) one of the main problems [involving patents as an indicator of innovation] is that an aggregation of patents, as well as other measures of technological innovation, includes items of very heterogeneous value: to add up patents implies that inventions with different economic and technological significance are merged”.

Moreover, as Schumpeter (1934) argued in his distinction between inventions and innovations, an invention becomes an innovation when it comes to the market embodied in new products. Accordingly, many inventions, regardless of their patentability, are just blueprints of new or improved products or productive means with no commercial value. As a methodological caution, then, patents should be regarded as being inventive measures rather than innovation (Freeman & Soete, 1997, p. 112).

Insofar as I am interested in the connection between invention and innovation rather than inventions per se, I will focus on R&D as a measure of regional levels of innovation in the state of São Paulo. In so doing, I will seek to overcome a limitation of the scholarship on regional development in Brazil, which takes data on patent counts as a proxy of regional innovation (cf. Gonçalves, 2007; Albuquerque, Simões, Baessa, Campolina, & Silva, 2002; Lemos, Campos, Biazzi, & Santos, 2006).

Patents – and patent counts, in particular - have been considered a problematic empirical measure of innovation since four decades ago (Kuznets, 1962; Pakes & Griliches, 1984; Griliches, 1990; Scherer, 1983; Mansfield, 1984; Acs & Audretsch, 2005). The literature on patents has pinpointed four major empirical flaws with respect to the use of patents as indicators of innovation. Although these flaws are well known in the literature on innovation (e.g. Smith, 2005; Kleinknecht, Montfort, & Brouwer, 2002; Griliches, 1990; Acs & Audretsch, 2005), it is worth mentioning them here in light of the empirical purposes of this paper – which seeks to prove the point that R&D investments are superior to patent counts as indicators of innovative activity at the regional level.

First, not all inventions that become innovative output are patentable (Griliches, 1990; Acs & Audretsch, 2005). Not all types of knowledge applied

to the production of new goods and industrial organizations can be translated into codified knowledge –tacit knowledge cannot be “stated or measured in an explicit form” (Freeman & Soete, 1997, pp. 405-06), and because of the latter, cannot be patented⁴¹

Second, some inventions that become innovations are not patented (Pakes & Griliches, 1984; Griliches, 1990; von Hippel, 1988) – for instance, some firms, depending on the structure and regulation of the competitive markets in diverse national as well as sectoral contexts, adopt industrial secrecy as a way to protect their knowledge assets (Archibugi & Pianta, 1996, p. 453)⁴². As Mansfield (1986) points out, there are considerable interindustry and interfirm differences when it comes to patenting as a way of protecting knowledge assets; firms tend to avoid patent applications when the rate of technological progress in a given sector is high because the cost of patenting overcomes its benefits – as a consequence, potential patents, in those sectors, tend to become obsolete in a short period of time. The propensity to patent is thus decisively affected by those sectoral as well as institutional differences in the production of new industrial knowledge (Mansfield, 1986; see also Scherer, 1983)⁴³.

Third, the magnitude of technological progress embodied in a given patent greatly varies by industrial sector as well as by the size of the firm (Kuznets, 1962; Pakes & Griliches, 1984; Griliches, 1990; Scherer, 1984; Kleinknecht,

⁴¹ According to Witt & Zellner (2007), tacit knowledge is generally transferred through personal mobility of R&D workers across research labs – the main institutional form of transfer of tacit knowledge being the migration of workers from academic (non-commercial) research to R&D labs of private firms.

⁴² As von Hippel (1988, p. 48) empirically demonstrates, economic agents tend to see patents as an ineffective way to protect the assets of knowledge produced by individuals and firms. The patent system, he argues, “is *not* seen by innovators as very effective in general and, by implication, that it is not seen as effective in protecting innovators’ rights to knowledge they might wish to license” (von Hippel, 1988, p. 48).

⁴³ As Mansfield (1986, p. 176) observes, “in some cases, firms rely instead on trade secrets, because technology is progressing so rapidly that it may be obsolete before a patent issues, because it is very difficult to police the relevant subject matter, or for other reasons. Also, in cases where technological advances are very difficult and costly to copy, patent protection may not seem worthwhile.”

Montfort, & Brouwer, 2002); as result, patent counts aggregated by regions are an extremely problematic measure because it does not empirically capture the technological intensity of patent assignees in technologically diverse economic regions.

Fourth, the propensity to patent - as defined by Scherer (1983) and Mansfield (1986) - not only affects a sectoral comparison between patent assignees but also undermines regional analyses based on patents. Regional economies where firms and industrial sectors have a higher propensity to patent (e.g. a higher patent-per-R&D ratio) will be overestimated regardless of the technological intensity of the firms located in those diverse regional economies (e.g. the economic impact of technological activity as well as differences in the productivity of R&D among regions are not captured by sheer patent counting).

In light of those methodological flaws, Kuznets (1962, p. 23) seminally observed that it is impossible to make an empirical distinction between the scientific discovery as well as the technical progress embodied in patents and their economic usefulness – insofar as many patents do not have practical application.

In a Schumpeterian fashion, patents are more related to inventions than they are connected to innovations (for the conceptual distinction between invention and innovation, see Schumpeter, 1934; Swedberg, 2000).

In line with that distinction, Kuznets (1962, p. 23) avers that “many inventions never reach this stage [a technically feasible innovation commercialized in the market]; and practically all inventions when they are completed and even when they are recorded, are still far from the test of usefulness. To be sure, a patented invention must “work”, i.e., the device must perform the task that the inventor claims for it; and the same test must

be applied when unpatented inventions are recorded. But technical feasibility is a far cry from economic usefulness; and no assurance of the latter can be given at the time the invention is made.”

In addition to this methodological difficulty, Kuznets (1962) adds that the magnitude of invention, i.e. the technological impact of inventive activity, is barely captured by patents⁴⁴. Another major methodological problem involved in the use of patents as proxies of innovation in Brazil is the difficulty associated to tracing the origin of invention in firms. As Galina (2005) points out, patent applications in the Brazilian patent system are often granted to the headquarters of firms instead of being granted to the local units which produce the innovation inside the organizational structure of firms. Consequently, São Paulo is overestimated in patent analyses because the city concentrates the major headquarters of manufacturing firms in Brazil.

This reveals the methodological backwardness of urban and regional theory in Brazil when it comes to analyzing the relationship between technology and regional development (cf. Gonçalves, 2007; cf. Albuquerque, Simões, Baessa, Campolina, & Silva, 2002; cf. Lemos, Campos, Biazzi, & Santos, 2006).

Given the inadequacy of recent efforts to define regional innovation in the Brazilian context (cf. Gonçalves, 2007; cf. Diniz & Campolina, 2007; cf. Lemos, Moro, Domingues, & Ruiz, 2005), I will engender a methodology to reckon with the absence of regional data on R&D in São Paulo, which is, on the one side, more consistent with internationally consolidated techniques of investigation (e.g. Polenske, 2007); on the other side, data on R&D better

⁴⁴ Jaffe & Trajtenberg (2002) adopt patent citations as proxies of the technological impacts of patents in different sectors of economic activity. A regional analysis of patent citations in the United States was undertaken by O'Hallachain and Leslie (2007). This approach is impossible to be adopted in Brazil given the precarious conditions of patent data in the country.

equip investigators to empirically capture the entrepreneurial function, and consequently innovation at the regional level.

5.3. Estimation Procedures (Research and Development, R&D)

Initially, I assumed a strong positive correlation between the Value of Industrial Transformation (VTI) and the presence of R&D activities at the regional level. In other words, the first hypothesis to be followed was that the presence of VTI in sub-national units of the country (in this case, the geographic micro-regions delimited by IBGE) was strongly correlated with the intensity of R&D activities carried out in those regions. Accordingly, the first step of the estimation procedure was to take the geographic concentration of VTI, at the regional and sectoral levels, as a proxy of the geographic concentration of investments in R&D.

The estimation procedure can be expressed by the following formula:

$$RD_{itj} = \left(\frac{VTI_{itj}}{VTI_{stj}} \right) * (RD_{stj})$$

RD_{itj} represents R&D investments in region i , in year t and in sector j (estimated value).

VTI_{itj} represents the VTI in region i , in year t and in sector j .

VTI_{stj} represents the VTI in the state of São Paulo s , in year t and in sector j .

RD_{stj} represents R&D investments in state of São Paulo s , in year t and sector j .

Consequently, the total of R&D investments in a given micro-region of the state of São Paulo is expressed by the sum of R&D investments for all 24 sectors in that region:

$$RD_{it} = \sum_{j=1}^{24} RD_{itj}$$

RD_{it} represents the total of R&D investments in region i and year t .

RD_{itj} represents R&D investments in region i , year t and sector j .

Since IBGE does not provide regional data on VTI in their Annual Industrial Survey (PIA), I contacted the Manufacturing Division at IBGE requesting a special dataset on VTI disaggregated by micro-regions in the state of São Paulo between 1996 and 2005 as well as by all the 2-digit manufacturing divisions (CNAE) – data on CNAE 245 and CNAE 353 were estimated, as I have already explored (see Figure 3.8).

Following the advice of IBGE technicians, I did not request data at the level of cities; nor did I try to go further in more disaggregated CNAE divisions, which would have been the ideal scenario. A more disaggregated VTI database – at the level of cities, for instance, would incur in high levels of statistical confidentiality due to the fact that, in many cities, the identification of firms would have been possible. The manufacturing sector, in small municipalities, is generally comprised by a limited number of industrial plants; in this case, the disclosure of the VTI would be a way to identify firms in those cities, which is legally forbidden in the Brazilian statistical system.

Despite those methodological limitations, I proceeded to the estimation of R&D investments for the 24 CNAE industrial divisions exposed in Figure 3.8; this estimation procedure yields data on R&D investments in the 64 micro-

regions in the state of São Paulo. As I pointed out before, the Survey on Industrial Innovation (PINTEC) undertaken by IBGE provides data on R&D investments for those 24 industrial divisions at the state level⁴⁵. The estimation consisted of multiplying the proportional geographical concentrations of the VTI for 24 CNAE industrial divisions in the 64 micro-regions in the state of São Paulo by the aggregate value of R&D investments for those CNAE divisions in the state of São Paulo provided by the PINTEC.

Nonetheless, I dealt with high levels of statistical confidentiality in some micro-regions. Some micro-regions had high levels of “hidden” data due to statistical confidentiality because of a high concentration of VTI being produced by a limited number of industrial plants. Although this problem did not affect the levels of statistical confidentiality for the datasets (3.5% in 2000; 3.1% in 2003; and 2.2% in 2005), I decided to estimate the statistical confidentiality of those micro-regions by crosschecking data on VTI produced by IBGE with data on the database on industrial value added kept by SEADE Foundation in São Paulo. In order to do that, I just explored methodological differences between the two agencies. Because of techniques

⁴⁵ In some cases, IBGE omitted data on R&D investments for some of those industrial divisions. Although this was not a recurrent case, I estimated those investments using the proportional distribution of VTI among the omitted divisions, following the insights brought to the fore by Amsden & Tschang (2003, p. 565). Seeking to estimate the share of foreign-owned companies in the total of the general expenditures in research and development (GERD), Amsden & Tschang (2003, p. 565) establish a proportional relationship between the manufacturing value added and research and development investments: “the share in Singapore in manufacturing value added of foreign-owned firms (using 50% equity as a cut-off) was 72% in 1998 (...)The private sector’s share of Singapore’s GERD in was reported to be 61.6% (...)Therefore, the share of the foreign private sector in GERD may be estimated to have been as much as 44%”. As I will show, this insight by Amsden & Tschang (2003) pervades the main methodological steps of the estimation procedure I have devised for R&D investments in São Paulo. On the one hand, in the PINTEC survey, R&D investments for some industrial divisions are aggregated in a single category called “other sectors”. In order to disaggregate that category into the industrial divisions that comprise it, I multiplied the proportion of each sector in the VTI by the total value of the category “other sectors” following Amsden & Tschang’s ideas on the direct relationship between value added and R&D (Amsden & Tschang, 2003). On the other hand, as I will demonstrate, a direct relationship between the manufacturing value added and R&D investments was assumed when I multiplied the geographical share of the manufacturing VTI in a given sector by the value of R&D in that sector for the state of São Paulo, as provided by the IBGE.

of data collection, value-added data on some sectors “hidden” by IBGE in some micro-regions is disclosed by SEADE Foundation. To estimate the statistical confidentiality in some micro-regions I adopted the proportional share of the IBGE undisclosed sectors in the SEADE Foundation database. Insofar as the manufacturing value-added and the VTI are basically the same data on industrial production, the estimation was consistent with the purpose of reducing the levels of statistical confidentiality in a few micro-regions.

At this stage, I had data on R&D investments in the state of São Paulo in 2000, 2003, and 2005 for the 64 micro-regions in the state as well as for the 24 CNAE industrial divisions (see Figure 3.7; Figure 3.8). After the estimations were made, I faced one of the most challenging problems of the methodological procedure I have devised. As I pointed out before, I assumed that the more the VTI produced by an industrial unit the more intense the adoption of knowledge-intensive practices in that unit, which would in turn lead to higher R&D investments. However, this assumption was just an insight, and, albeit followed by other authors (Amsden & Tschang 2003), it could still be challenged statistically.

In order to face that challenge, I resorted to some estimation and projection procedures adopted in the Frascati Manual, published by OECD in 2002 (OECD, 2002). Insofar as it is the product of the efforts of statisticians in the OECD countries undertaking R&D surveys, the Frascati Manual is one of the most comprehensive methodological tools for surveys on R&D. Although the manual does not fully contemplate the estimation procedures I followed to engender a regional database of investments in R&D in the state of São Paulo, it was a fundamental source of statistical steps to follow in that, as I have demonstrated, regional data on R&D investments are not readily available to researchers in Brazil.

According to the Frascati Manual, whenever data on R&D is not available at hand, it can be estimated as well as projected through the adoption of correlation/regression techniques as long as a proportional relation is found between R&D data and other sets of variables (OECD 2002, pp. 213-14). Therefore, a strong statistical correlation between the geographical concentration of R&D investments and a proxy of R&D activities at the regional level had to be found so that the database could be statistically consistent.

In this case, a strong relationship between the estimated R&D data and a proxy of R&D activities at the regional level had to be statistically established. The estimation procedure I adopted is based on the hypothesis that R&D investments are made in the local productive unit, where the VTI is produced. As a consequence, a low correlation between the results of the estimation and a proxy of R&D activities at the regional level would empirically mean that R&D investments are undertaken outside the local productive unit of the firm – e.g. firms which have a productive unit in one region but undertake R&D activities in other places. In this case, the results of the estimation procedure I followed would be unreliable at the regional level.

Seeking to construct a proxy of industrial R&D activities at the level of micro-regions in São Paulo, I resorted to the Annual Survey on Workers (RAIS); RAIS provides data on workers at the level of micro-regions for all CNAE industrial divisions adopted in this paper (see Figure 3.8). Based on the Brazilian Classification of Occupations (CBO) adopted by RAIS, I was able to build a proxy of R&D workers for all industrial sectors of CNAE by selecting workers in the most qualified occupations of the industrial force; I assumed that these workers are *most likely* related to R&D activities in the local units of firms (see Figure 3.9; Figure 3.10).

Figure 3.9 – Proxy of R&D-related Workers in Manufacturing in the Year 2000 according to the Brazilian Classification of Occupations in 1994 (CBO-94)

CBO94 Code	Description of the occupation (RAIS-CBO) in 2000
0-11	Chemists and chemical engineers
0-12	Physicists - thermophysics, accoustics, nuclear and optics
0-19	Electrical engineers; geophysicists
0-20	Agronomists and food engineers
0-22	Industrial designers; mechanical engineers
0-23	Telecommunications engineers
0-24	Mechanical enginners; aerospace engineers; naval engineers
0-25	Chemical engineers - rubber; paper and pulp; petrochemicals
0-26	Metal engineers
0-28	Production engineers
0-29	Materials engineers
0-51	Biologists
0-52	Biotechnology professionals - biochemicals; pharmaceuticals
0-84	Professionals related to information systems (IT professionals)

Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.
Ministério do Trabalho e Emprego (MTE) (1994), *Classificação Brasileira de Ocupações - CBO*
(1st Edition).

The CBO changed in 2002. In light of that change in the classification of occupations, I used the matrix of compatibility provided by the Ministry of Labor in Brazil in order to build a similar proxy for 2000, 2003 and 2005. By making use of that matrix, I could make sure that the occupations in 2003 and 2005 would be compatible, in terms of classification, to those in 2000. More importantly, the compatibility between different classifications of occupations would ensure the consistency of the proxy of R&D workers between 2000 and 2005 (see Figure 3.10).

Figure 3.10 – Proxy of R&D-related Workers in Manufacturing in 2003 and 2005 according to the Brazilian Classification of Occupations in 2002 (CBO-2002)

CBO2002 Code	Description of the occupation (RAIS-CBO) in 2003 and 2005
2011	Professionals of biotechnology
2012	Professionals of metrology
2021	Mechatronics engineers
2030	Researchers in biological sciences
2031	Researchers in natural sciences and exact sciences
2032	Researchers in engineering and technology
2033	Researchers in health sciences
2034	Researchers in agricultural sciences
2122	Computer engineers
2131	Physicists
2132	Chemists
2133	Professionals of atmospherical, spatial and astronomical sciences
2143	Electrical and electronic engineers
2144	Mechanical engineers
2145	Chemical engineers
2146	Metal engineers
2149	Production and quality engineers
2221	Agronomists; agronomical engineers

Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.
Ministério do Trabalho e Emprego (MTE) (2002), *Classificação Brasileira de Ocupações - CBO*
(2nd Edition).

In the absence of data on local R&D labs, this proxy, albeit imperfect, is a measure of local units of industrial firms undertaking R&D. Professional employment in R&D-related activities has been used by the literature on spatial patterns of innovation as a proxy of industrial R&D activities at the local level undertaken by private firms (e.g. Bania, Calkins, & Dalenberg, 1992; Anselin, Varga, & Acs, 2000; Acs, Anselin, & Varga, 2002).

After the construction of the proxy of private R&D activities undertaken by local units of private firms, the final step in the estimation procedure was to run a simple correlation model between the estimated R&D values and the proxy of R&D activities for all four technological divisions shown in Figure

3.8: high-tech industries, medium high-tech industries, medium low-tech industries and low-tech industries. Such a division makes the results of the estimation comparable to countries that follow the procedures of the OECD to collect data on R&D activities (OECD, 2002; OECD, 2007).

The results of the performed correlations are exposed in Figure 3.11.

Figure 3.11 - Simple correlation coefficients (multiple r) between estimated R&D investments by technological intensity and the proxy of R&D workers at the regional level (p values are between brackets) (2000, 2003 and 2005)

	2000	2003	2005
High-Tech Industries	0.9663 (p<0.0001)	0.9660 (p<0.0001)	0.9973 (p<0.0001)
Medium-High-Tech Industries	0.9773 (p<0.0001)	0.9883 (p<0.0001)	0.9846 (p<0.0001)
Medium-Low-Tech Industries	0.9753 (p<0.0001)	0.9818 (p<0.0001)	0.9719 (p<0.0001)
Low-Tech Industries	0.9627 (p<0.0001)	0.9562 (p<0.0001)	0.9453 (p<0.0001)
All manufacturing sectors	0.9474 (p<0.0001)	0.9710 (p<0.0001)	0.9943 (p<0.0001)

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa de Inovação Tecnológica (PINTEC).
Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Organization for Economic Co-Operation and Development (OECD), *OECD Science, Technology and Industry Scoreboard 2007*. Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.
Author's elaboration.

The very high correlation coefficients exposed in Figure 3.11 give consistency to the estimation procedures I adopted. As Figure 3.11 shows, there is almost perfect correlation between the estimated R&D investments in the manufacturing sector and the proxy of R&D-related professional workers in manufacturing.

6. Empirical Results: geographical and sectoral patterns of the VTI and of R&D investments in manufacturing in the state of São Paulo

With respect to the geographical concentration of the Value of Industrial Transformation (VTI) in the state of São Paulo, there are two clear empirical directions.

First, the patterns of industrial deconcentration in the state of São Paulo are very diverse sectorally and technologically. As Figure 3.12 shows, the share of the micro-region São Paulo – the core of the metropolitan region – in the high-tech industrial sectors grew substantially between 2000 and 2005 (see Figure 3.12, column A). In 2000, the share of the MRSP in the VTI produced by high-tech manufacturing sectors in the state of São Paulo was 45.13%, while in 2005 that same share rose to 49.69% (see Figure 3.12, column A). This movement of geographical concentration of knowledge-intensive activities inside the MRSP was lead by the micro-regions São Paulo (the city of São Paulo and the ABC region), Osasco and Itapecerica da Serra (see Figure 3.12, column A). By perusing the Map Set 3.1, in the Appendix, the reader will observe that the metropolitan core articulates significant industrial chains in CNAE 245 (Pharmaceuticals-Biotechnology), CNAE 30 (Computing Equipment) and CNAE 33 (Precision Instruments) (see Appendix, Map Set 1). As for the medium-high tech industries, the metropolitan core is strong in the production of cars and chemicals (CNAE 34 and CNAE 24 – excluding CNAE 245, respectively) (see Appendix, Map Set 3.1). Consequently, the geographical concentration of the medium-high tech industries in the metropolitan region remained stable between 2000 and 2005. The share of the MRSP in the VTI of medium high-tech manufacturing industries slightly declined from 49.62% to 48.64% (see Figure 3.12, column B). The strong presence of medium high-tech industries in the metropolitan

core shows that the industrial space promoted by heavy state subsidization in the fifties has not been disarticulated. In regards to industrial sectors which are less intensive in knowledge, there has been an intense movement of geographical deconcentration from the MRSP to the countryside of the state. On the one hand, this movement is consentaneous with the predictions of the Campinas School: the “interiorization” of industrial location of sectors which are intensive in natural resources, such as agro-industries (CNAE 15) and light consumer goods – e.g. textiles, clothing and shoes (CNAE 17, CNAE 18 and CNAE 19), has been remarkable between 2000 and 2005. The share of the MRSP in the VTI produced by low-tech industries declined from 40.54% to 34.20% between 2000 and 2005 (Figure 3.12, column D). It is interesting to note that the deconcentration of low-tech industries has taken place beyond the expanded metropolitan area. Between 2000 and 2005, the share of regions outside the expanded metropolis in the VTI of low-tech industries rose from 26.96% to 33.37% (Figure 3.12, column D). This pattern clearly brings into light a tendency towards specialization of the metropolitan area in more knowledge-intensive manufacturing sectors (Figure 3.12, columns A, B, D and D). Not coincidentally, the expanded metropolitan area – or the macro-metropolis (e.g. Matteo, 2007) – concentrated 97.68% of the VTI in high-tech sectors in 2005 (see Figure 3.12, column A).

Second, the empirical results presented in Figure 3.12 show that manufacturing location in the state of São Paulo is a metropolitan phenomenon. As I have pointed out elsewhere, there has been a reorganization of regional manufacturing production inside the expanded metropolitan area: manufacturing firms have relocated to areas in the metropolitan outskirts since early seventies in order to take advantage of economies of agglomeration in the metropolitan region (Acca, 2006; see also

Matteo, 2007). By comparing Figure 3.6 and Figure 3.12, the reader will see that the movements of manufacturing relocation in the state of São Paulo has taken place within a radius of 150 kilometers from the city of São Paulo since 1970 – which is the pattern predicted by Azzoni (1986). The share of the VTI produced by the city of São Paulo and its hinterlands in the total VTI of the state has remained relatively stable since 1970 – as Figure 3.6 and Figure 3.12 show, that share has remained around 85% between 1970 and 2005, despite some movements of concentration and deconcentration in those years (Figure 3.6; Figure 3.12; see also Appendix, Map Set 1).

These numbers clearly illustrate that manufacturing sectors are still important to the economic vitality of the metropolitan region, including the city of São Paulo. The fact that manufacturing firms have mostly migrated to regions near the city of São Paulo unveils the consolidation of an expanded manufacturing space for manufacturing production in São Paulo (see Appendix, Map Set 1). More importantly, the empirical evidence explored thus far points to alternative explanatory directions to those offered by the Campinas School as well as by the world-city/global-city perspectives. On the one hand, the “interiorization” of industrial development is restricted to low-tech manufacturing sectors. On the other hand, the dynamics of manufacturing in the metropolitan area, including the metropolitan core, invalidates the arguments that the metropolis is on the verge of a functional transition from manufacturing to services as main anchors of economic development – in other words, the city does not show signs of deindustrialization, as opposed to the classic examples of global cities, such as New York and London (cf. Sassen, 1998; Sassen, 2001; cf. Abrahamson, 2004; cf. Meyer, Grostein, & Biderman, 2004; cf. Biderman, 2004).

Figure 3.12 – Geographical Distribution of the Value of Industrial Transformation, in percentage (2000-2005)

	<i>Geographical concentration of VTI (in percentage)</i>														
	<i>A. High Tech Sectors</i>			<i>B. Medium High Tech Sectors</i>			<i>C. Medium Low Tech Sectors</i>			<i>D. Low Tech Sectors</i>			<i>All sectors (A+B+C+D)</i>		
	2000	2003	2005	2000	2003	2005	2000	2003	2005	2000	2003	2005	2000	2003	2005
"Expanded" Metropolis															
<i>Metropolitan Region of Sao Paulo (MRSP)</i>															
SAO PAULO	23.80	24.26	25.48	37.57	35.21	35.51	26.80	22.57	23.71	28.76	21.39	21.12	30.20	26.47	26.90
GUARULHOS	11.41	10.77	9.15	3.49	4.25	4.00	2.91	2.99	3.12	4.24	3.81	4.12	4.60	4.37	4.25
OSASCO	2.96	4.91	6.08	3.79	3.13	3.71	2.20	1.81	2.43	3.40	3.45	3.64	3.13	3.01	3.52
MOJI DAS CRUZES	1.84	0.12	0.08	2.13	2.62	2.86	1.67	1.35	1.67	3.30	4.23	4.29	2.31	2.49	2.63
ITAPECERICA DA SERRA	5.12	5.16	8.90	2.04	1.77	1.92	0.97	0.79	1.07	0.64	0.69	0.64	1.74	1.48	1.96
FRANCO DA ROCHA	0.00	0.01	0.00	0.60	0.69	0.44	0.10	0.09	0.26	0.20	0.38	0.39	0.27	0.36	0.33
MRSP - Total	45.13	45.23	49.69	49.62	47.67	48.44	34.65	29.60	32.27	40.54	33.94	34.20	42.23	38.17	39.58
<i>Metropolitan Hinterland</i>															
CAMPINAS	19.15	18.12	21.64	13.41	13.50	13.19	22.07	26.12	25.09	7.81	6.05	5.82	14.91	15.41	15.62
SAO JOSE DOS CAMPOS	30.43	30.66	22.37	13.81	10.28	9.36	15.52	16.04	14.03	6.30	4.18	3.57	14.27	12.07	10.42
SOROCABA	2.49	2.63	2.23	4.72	4.84	5.03	5.00	5.55	5.13	3.20	4.62	5.03	4.06	4.77	4.80
SANTOS	0.00	0.00	0.00	2.69	3.35	2.92	9.39	9.65	10.76	0.38	0.36	0.36	3.50	3.99	4.36
JUNDIAI	0.23	0.14	0.13	2.64	3.33	3.51	2.09	1.81	1.88	5.13	4.40	4.87	2.90	2.90	3.06
PIRACICABA	0.00	0.02	0.00	1.61	1.80	2.51	0.85	0.74	1.32	2.13	3.69	2.76	1.34	1.88	1.97
LIMEIRA	0.06	0.07	0.04	0.98	1.88	2.20	0.83	0.85	0.99	2.81	4.52	5.68	1.36	2.19	2.59
MOJI-MIRIM	0.87	1.01	1.16	1.33	1.37	1.65	0.24	0.21	0.25	2.85	3.20	2.39	1.42	1.54	1.37
BRAGANCA PAULISTA	0.25	0.21	0.42	0.62	0.87	1.11	0.25	0.24	0.30	1.04	1.34	1.01	0.59	0.76	0.76
TATUI	0.00	0.00	0.00	0.38	0.79	0.89	0.35	0.24	0.21	0.85	0.97	0.94	0.46	0.61	0.61
Metropolitan Hinterland - Total	53.49	52.87	47.99	42.18	42.02	42.36	56.60	61.45	59.95	32.50	33.32	32.43	44.80	46.13	45.58
Expanded Metropolis - Total	98.61	98.10	97.68	91.80	89.68	90.80	91.24	91.05	92.22	73.04	67.26	66.63	87.04	84.30	85.16
Other Microregions - Total	1.39	1.90	2.32	8.20	10.32	9.20	8.76	8.95	7.78	26.96	32.74	33.37	12.96	15.70	14.84
State of Sao Paulo - Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

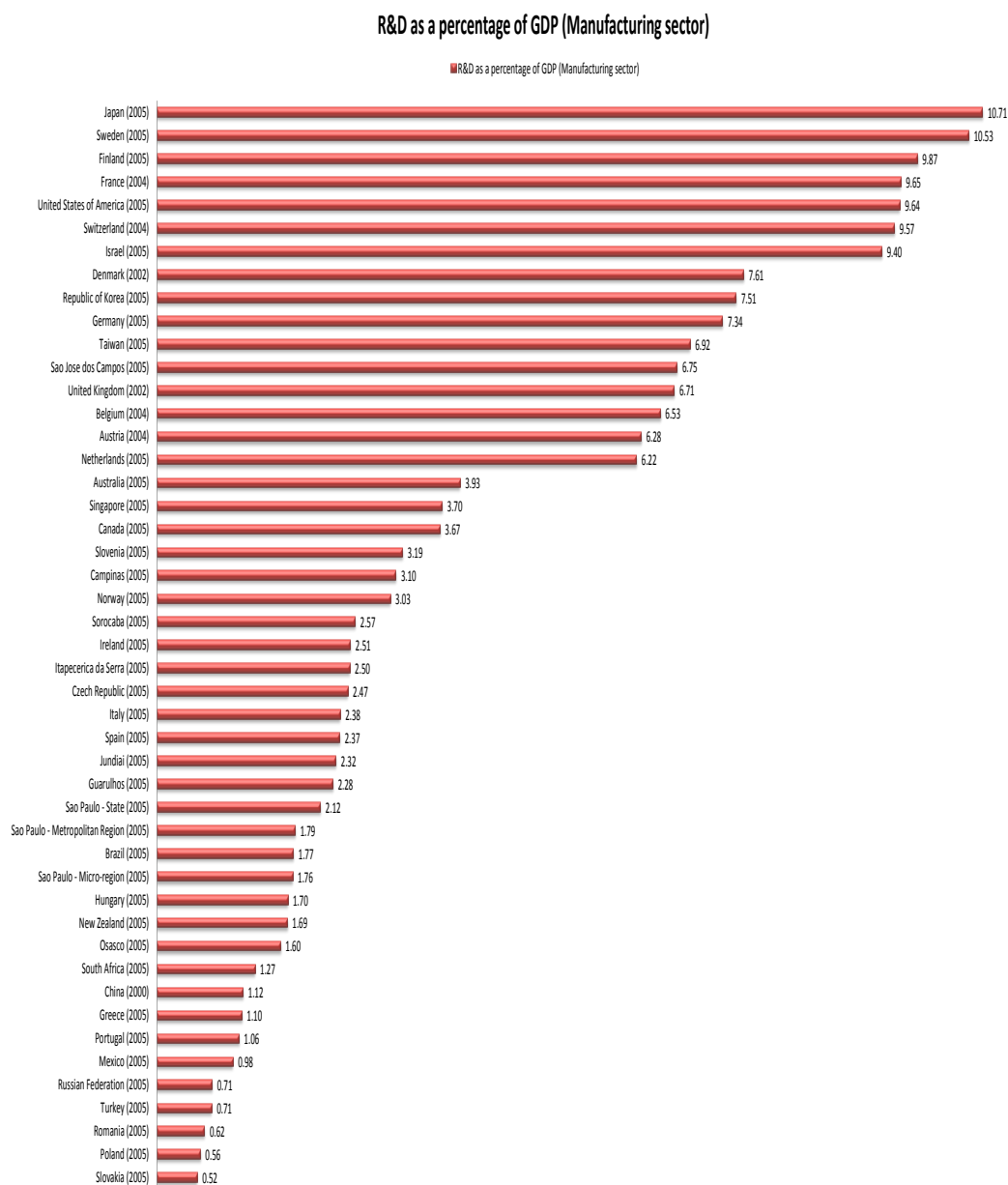
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais). Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal). Organization for Economic Co-Operation and Development (OECD), *OECD Science, Technology and Industry Scoreboard 2007*.

Author's elaboration.

When it comes to R&D investments as a percentage of the manufacturing GDP, the latest available data for the state of São Paulo show a very unequal scenario (Figure 3.13). Although some micro-regions in the state - such as São José dos Campos, Campinas, Sorocaba and Itapeverica da Serra - can be compared to advanced countries in terms of technological intensity in the manufacturing sector, firms located in the metropolitan core and in the MRSP perform poorly with respect to R&D intensity compared to other micro-regions in São Paulo (Figure 3.13). In general, Figure 3.13 shows that the manufacturing sectors in the state of São Paulo are still far from manufacturing in most advanced countries with respect to innovative activities. Manufacturing firms in the state of São Paulo invest, on average, 2.12% of the GDP they produce in R&D activities (see Figure 3.13). Although this figure is higher than the average investments in R&D made by manufacturing firms in Brazil – which invest, on average, 1.77% of the GDP in R&D activities, the performance of manufacturing firms in São Paulo is still distant from the most advanced countries, such as Japan, Sweden, Finland, France and the United States (Figure 3.13).

The poor performance of manufacturing firms in the metropolitan core as for R&D intensity – e.g. manufacturing firms in the city of São Paulo and the surrounding cities of the ABC region invest only 1.77% of the GDP in R&D activities – might be attributed to the fact that the core of the metropolis is the oldest industrial space in Brazil. As a consequence, the metropolitan core is, according to Matteo (2007, pp. 172-173) a hybrid space with respect to industrial productivity, since it concentrates very advanced firms as well as industrial plants struggling with aged industrial equipment and low productivity levels.

**Figure 3.13 – R&D Investments as a percentage of GDP:
manufacturing sector in selected countries and regions (2005, or the
latest available year)**



Source: United Nations Conference on Trade and Development (UNCTAD), *Handbook of Statistics*. International Monetary Fund (IMF), *World Economic Outlook*. Organization for Economic Co-operation and Development (OECD), *OECD.Stat*. Organization for Economic Co-operation and Development (OECD), *Business enterprise intramural expenditure on R&D - BERD - by industry, Vol 2009, release 1*. Instituto Brasileiro de Geografia e Estatística (IBGE), *Pesquisa de Inovação Tecnológica*.

The geographical concentration of R&D investments in manufacturing, shown in Figure 3.14, reveals that the avionics sector (CNAE 353) is the most important player in the system of innovation of the state of São Paulo. Accordingly, the micro-region São José dos Campos, where EMBRAER is located, accounted for 54.58% of R&D investments made by high-tech manufacturing firms in the state of São Paulo (Figure, 14, column A); as the maps in the Appendix show, São José dos Campos is a traditional producer of airplanes (CNAE 353), communications equipment (CNAE 32) and precision instruments (CNAE 33); because of its specialization in those high-tech sectors, São José dos Campos concentrates a considerable share of R&D activities in São Paulo (Figure 3.14; see also Appendix, Map Set 3.1 and Map Set 3.2). As Diniz & Razavi (1999) point out, São José dos Campos is a successful example of state policies oriented to developing high-tech clusters in Brazil. The creation of the Technological Institute of the Brazilian Air Force (ITA) and the implementation of the Department of Aerospace Science and Technology (DCTA) were fundamental steps to the market success of EMBRAER – one of the most important producers of regional airplanes in the world today (Diniz & Razavi, 1999; Bernardes & Oliveira, 2003). Not coincidentally, as Figure 3.13 shows, the R&D intensity of São José dos Campos (6.75% of the industrial GDP) is comparable to that of United Kingdom and Germany.

Figure 3.14 – Geographical Distribution of Research and Development (R&D), in percentage (2000-2005)

	Geographical concentration of R&D (in percentage)														
	A. High Tech Sectors			B. Medium High Tech Sectors			C. Medium Low Tech Sectors			D. Low Tech Sectors			All sectors (A+B+C+D)		
	2000	2003	2005	2000	2003	2005	2000	2003	2005	2000	2003	2005	2000	2003	2005
"Expanded" Metropolis															
Metropolitan Region of Sao Paulo (MRSP)															
SAO PAULO	13.52	8.34	16.30	39.26	38.19	38.14	36.57	32.71	31.79	19.44	16.57	17.72	28.88	27.80	30.69
GUARULHOS	8.97	5.00	3.40	4.45	4.94	4.67	5.46	5.46	5.21	3.81	3.26	3.60	5.78	4.88	4.31
OSASCO	1.63	1.84	2.68	3.91	2.54	3.61	4.34	3.33	4.20	3.10	2.90	3.29	3.17	2.41	3.40
MOJI DAS CRUZES	0.67	0.12	0.09	2.04	1.54	1.97	2.98	2.40	2.98	3.76	7.42	6.18	1.95	1.57	1.90
ITAPECERICA DA SERRA	1.95	1.11	2.33	1.91	1.20	1.21	1.67	1.54	2.01	0.73	0.95	0.99	1.75	1.18	1.53
FRANCO DA ROCHA	0.00	0.00	0.00	0.40	0.38	0.27	0.19	0.15	0.54	0.15	0.65	0.67	0.23	0.27	0.25
MRSP - Total	26.74	16.41	24.79	51.97	48.80	49.86	51.21	45.59	46.74	30.98	31.75	32.44	41.75	38.12	42.07
Metropolitan Hinterland															
CAMPINAS	18.44	12.30	16.25	13.00	14.53	13.36	9.66	11.80	13.12	8.42	7.82	5.78	13.71	13.27	13.46
SAO JOSE DOS CAMPOS	50.55	68.21	54.58	13.07	13.01	11.56	10.12	9.47	7.70	7.56	5.07	3.36	23.09	28.19	21.30
SOROCABA	2.69	1.87	2.15	4.63	4.46	4.41	11.89	10.09	7.89	4.09	4.76	5.74	4.62	4.09	4.19
SANTOS	0.00	0.00	0.00	1.64	1.87	2.47	0.16	6.76	4.87	0.33	0.21	0.24	0.86	1.53	1.84
JUNDIAI	0.29	0.07	0.07	2.57	3.62	3.38	3.54	3.23	4.12	6.42	4.46	5.21	2.49	2.63	2.76
PIRACICABA	0.00	0.01	0.00	1.46	1.19	1.29	1.92	1.27	1.84	2.61	3.76	2.85	1.22	1.03	1.13
LIMEIRA	0.02	0.01	0.01	0.91	2.18	1.73	1.23	1.43	2.49	3.37	5.25	5.71	1.00	1.71	1.67
MOJI-MIRIM	0.32	0.20	0.25	1.33	1.78	2.15	0.26	0.35	0.56	3.30	4.20	2.67	1.20	1.39	1.62
BRAGANCA PAULISTA	0.10	0.04	0.09	0.97	0.78	1.05	0.42	0.41	0.52	1.16	2.23	1.15	0.69	0.64	0.79
TATUI	0.00	0.00	0.00	0.53	0.62	0.90	0.38	0.32	0.36	0.95	1.32	1.08	0.42	0.47	0.66
Metropolitan Hinterland - Total	72.41	82.72	73.42	40.11	44.05	42.30	39.58	45.12	43.46	38.23	39.07	33.80	49.29	54.95	49.41
Expanded Metropolis - Total															
	99.14	99.14	98.21	92.09	92.85	92.16	90.79	90.71	90.20	69.21	70.82	66.24	91.05	93.07	91.48
Other Microregions - Total															
	0.86	0.86	1.79	7.91	7.15	7.84	9.21	9.29	9.80	30.79	29.18	33.76	8.95	6.93	8.52
State of Sao Paulo - Total															
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa de Inovação Tecnológica (PINTEC). Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais). Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal). Fundação SEADE, Pesquisa da Atividade Econômica Paulista (PAEP). Organization for Economic Co-Operation and Development (OECD), OECD Science, Technology and Industry Scoreboard 2007. Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).
Author's elaboration.

Despite the prominent role played by EMBRAER in the innovation system in the state of São Paulo, the micro-region São Paulo – the city of São Paulo and the ABC region – concentrates 30.69% of R&D investments in the state of São Paulo (Figure 3.14). Although the geographical movements of high-tech industries with respect to R&D investments hinge on the technological strategies of EMBRAER in São José dos Campos, the micro-region São Paulo concentrated 16.30% of R&D investments made by high-tech manufacturing firms in the state of São Paulo in 2005 (Figure 3.14, column A). The inheritances of the development strategies that subsidized the location of medium high-tech industries, mainly automobiles (CNAE 34) and chemicals (CNAE 24), in the metropolitan area of São Paulo can be seen in Figure 3.14, column B (see also Appendix, Map Set 3.1). In the automotive sector, for instance, as Dias & Salerno (2009) show, there has been a tendency of decentralization of R&D activities from advanced countries to the ABC region, where most of the transnational motor companies are located. Motor companies have taken advantage of the growing market for cars in Brazil, thereby investing in R&D labs in the ABC region seeking to adapt their products and technologies to the context of local markets (Dias & Salerno, 2009). In 2005, the micro-region São Paulo accounted for 38.14% of R&D investments made by manufacturing firms in the medium high-tech sector in the state of São Paulo; moreover, the MRSP accounted for 49.86% of R&D activities in medium high-tech industries in the state of São Paulo.

By comparing Figure 3.12 - which shows the geographical concentration of the VTI - and Figure 3.14, the reader will notice that the geographical concentration of R&D is higher than the geographical concentration of VTI in the metropolitan region. Furthermore, between 2000 and 2005, the share of the VTI of the micro-region São Paulo in the total of VTI the state declined

from 30.20% to 26.90 (Figure 3.12); on the other hand, the share of the micro-region São Paulo in the total of R&D investments slightly rose from 28.88% to 30.69% (Figure 3.14). Moreover, in 2005, the MRSP accounted for 42.07% of the R&D investments made by manufacturing firms in the state of São Paulo.

The empirical results here presented unequivocally show that the city of São Paulo and its immediate hinterland have been a preferred location for more complex manufacturing activities. In other words, the deconcentration of manufacturing is limited, on the one hand, to industries which are less dependent on knowledge-intensive inputs – e.g. food products and beverages (CNAE 15), textiles (CNAE 17), apparel (CNAE 18) and leather and footwear (CNAE 19); on the other hand, the interiorization of industrial development, as depicted by the Campinas School, is more intense in industries which are more dependent on natural resources – e.g. wood products (CNAE 20), paper (CNAE 21) and rubber and plastics products (CNAE 25) (see Appendix, Map Set 3.1).

Finally, the empirical results of this paper lead to an alternative explanatory picture with respect to the movements of manufacturing in the metropolitan region. There have been no signs of deindustrialization in the city as well as in the MRSP as a whole. As I have demonstrated over the course of this paper, there has been a movement of industrial relocation towards the immediate hinterlands of the city of São Paulo, which shows that manufacturing firms have taken advantage of being located near the city. The post-industrial metropolis, as I have empirically demonstrated, is a mental construction – albeit popular – devoid of any concrete evidence.

7. Concluding Remarks

Metropolitan regions are products of their own historical paths. This paper attempted to unveil the pitfalls of reproducing theories as well as conceptual models disconnected from the specific socio-economic trajectories carved out in different cities and metropolitan regions across the globe. Moreover, cities and metropolitan regions are engendered by their particular insertion in the capitalist trajectories of each country. Consequently, any broad perspective that does not take into account the historical roots of capitalist accumulation in the metropolitan area of São Paulo is doomed to produce a reified picture of the contemporary socio-economic dynamics in the city and its hinterland. First and foremost, São Paulo embodies the contradictions of a dependent mode of capitalist accumulation. The city grew in the wake of millions of bags of coffee exported to developed countries – industrialization, as I have shown, was financed, in large measure, by the transfer of profits from the coffee economy to manufacturing. Although this connection is not usually made, the heavy industrialization of the fifties – which consolidated the role of the MRSP as the center of manufacturing in Brazil with the implementation of more complex manufacturing (the automotive industrial chain, industrial equipment and chemicals) – was only possible because of the economies of agglomeration generated by the coffee-manufacturing binomial in the early twentieth century.

The global-city perspective, as applied to São Paulo, has a clear ideological component. The transition to knowledge-intensive service sectors as motors of economic development tries to portray the city as an anchor of the modern financial (or post-industrial) capitalism. Not coincidentally, the relationships between São Paulo and other cities at the top of a global hierarchy of global cities are stressed (e.g. Taylor, 2004; Marques & Torres, 2000). Recent urban

scholarship has argued that the MRSP is, in fact, on the verge of a functional transition to globalized service sectors as the core of economic dynamism (Biderman, 2004; Meyer, Grostein, & Biderman, 2004). Nonetheless, as I have pointed out elsewhere, the socio-economic dynamics of the MRSP, including the city, cannot be exclusively tied to the movements of global capitalism because Brazil only occupies a secondary position in the articulation of global financial flows; moreover, Brazil also occupies a minor role, compared to that of advanced economies, when it comes to transnational firms and outward foreign direct investments (FDI) (Acca, 2003; for a similar perspective in the case of Mexico City, see Ward, 2004). Despite the remarkable growth of the service sector in the metropolitan area, it is clear that a post-industrial economy alone would not create enough jobs to maintain the social reproduction of the workforce. Finally, the creation of service jobs in the metropolitan area is argued to be partially tied to movements of productive restructuring in manufacturing (Matteo, 2007); this seems to be a promising topic for future research because such argument needs empirical verification.

The post-industrial perspective fails to understand the metropolis in São Paulo as an expanding economic space. On the one hand, the city has lost manufacturing jobs since the 1970s but this has little to do either with a supposed functional transition to services or to deindustrialization. The peak of industrial concentration in the mid-seventies created diseconomies of agglomeration in the old industrial space of the metropolitan core, which stimulated manufacturing firms to search for new location sites inside the metropolitan area – because these firms would still be benefited from complementarities with the industrial chains located inside the metropolitan core. Azzoni (1986) called this locational opportunities within the state concentrated deconcentration. More recently, urban and regional scholarship

in São Paulo has argued that manufacturing location in São Paulo is essentially a metropolitan phenomenon (Lencioni, 2003; Matteo, 2007). On the other hand, knowledge-intensive manufacturing firms take advantage of being located in a traditional industrial environment – a qualified workforce, the best universities in the country and the most important R&D labs are located in the expanded metropolitan area. Consequently, as I showed, deconcentration of manufacturing is more intense in low-tech sectors. A comprehensive sectoral study of locational patterns in São Paulo is still to be done. Such a study would unveil the forces of agglomeration in each sector of economic activity as well as the interdependences between different branches of industry.

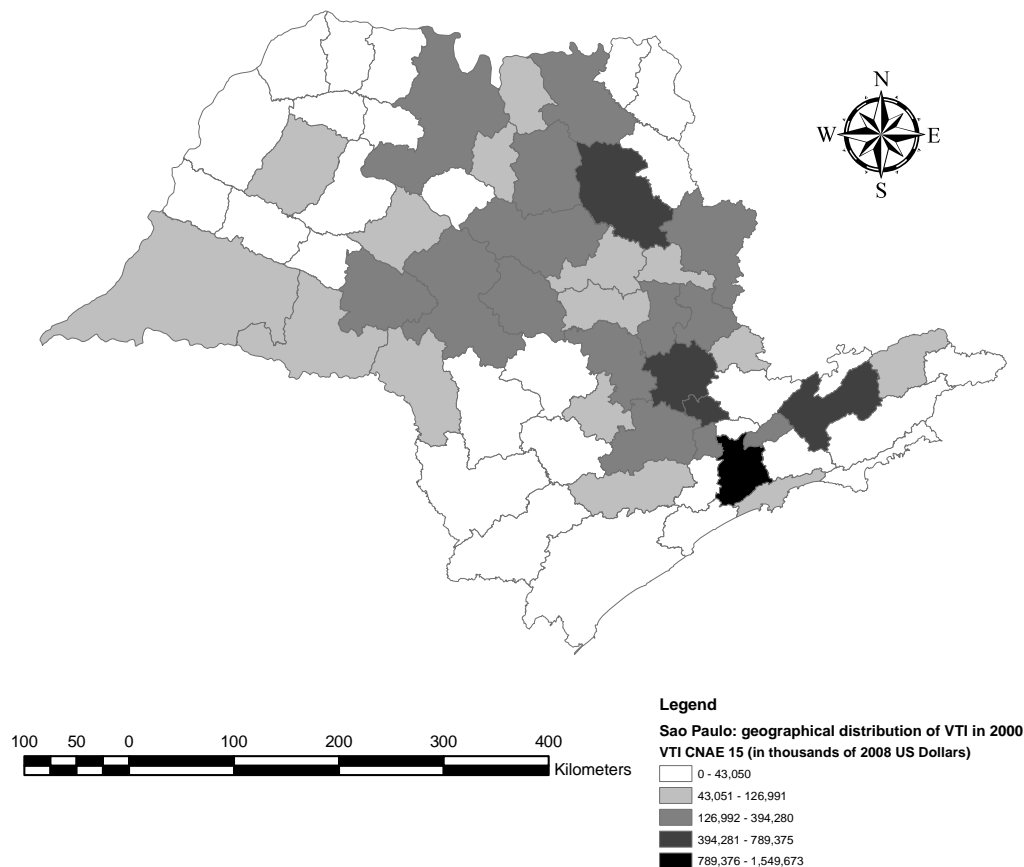
The fact that most of urban scholars in Brazil are concerned about the relationship between services and globalization in the city has consolidated the image of the post-industrial metropolis in São Paulo. I hope this paper can inspire other researchers to understand the city beyond the enticing ideologies of common sense...

APPENDIX

Map Set 3.1

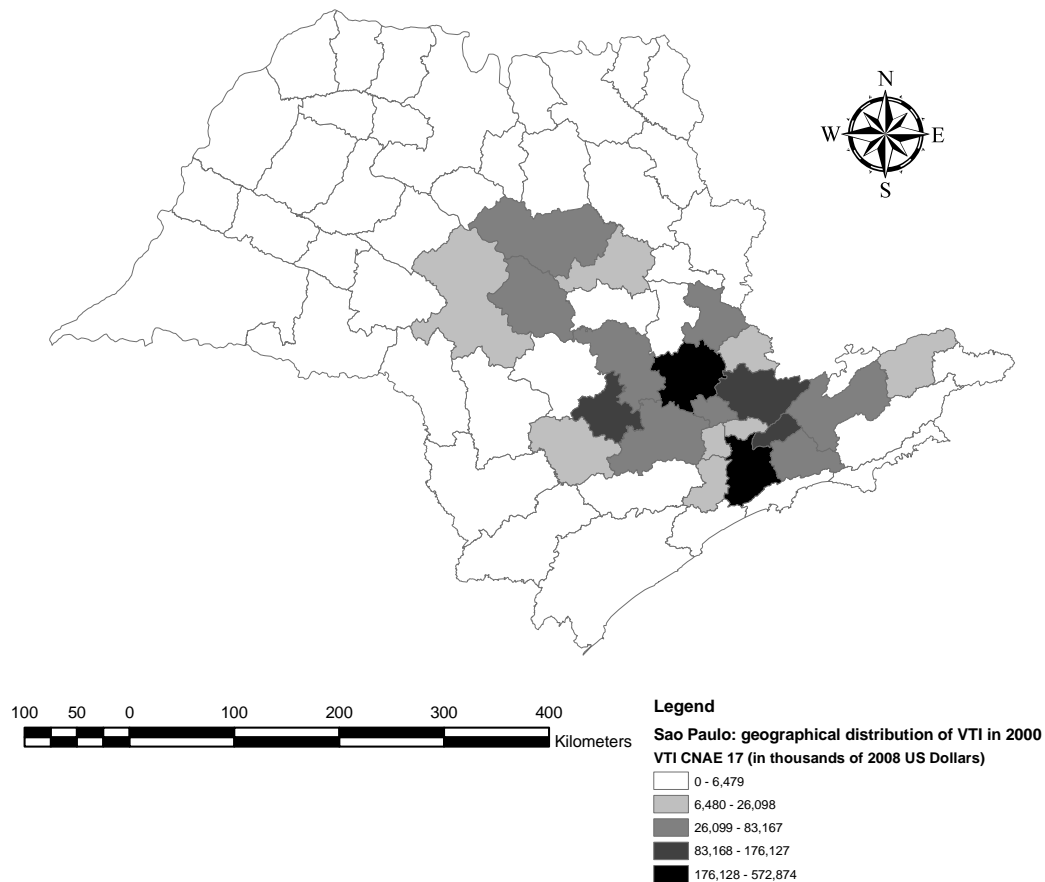
*Regional Distribution of the VTI
in the State of São Paulo by
Industrial Divisions (CNAE and
ISIC Rev.3) and Technological
Classification
(2000, 2003 and 2005)*

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



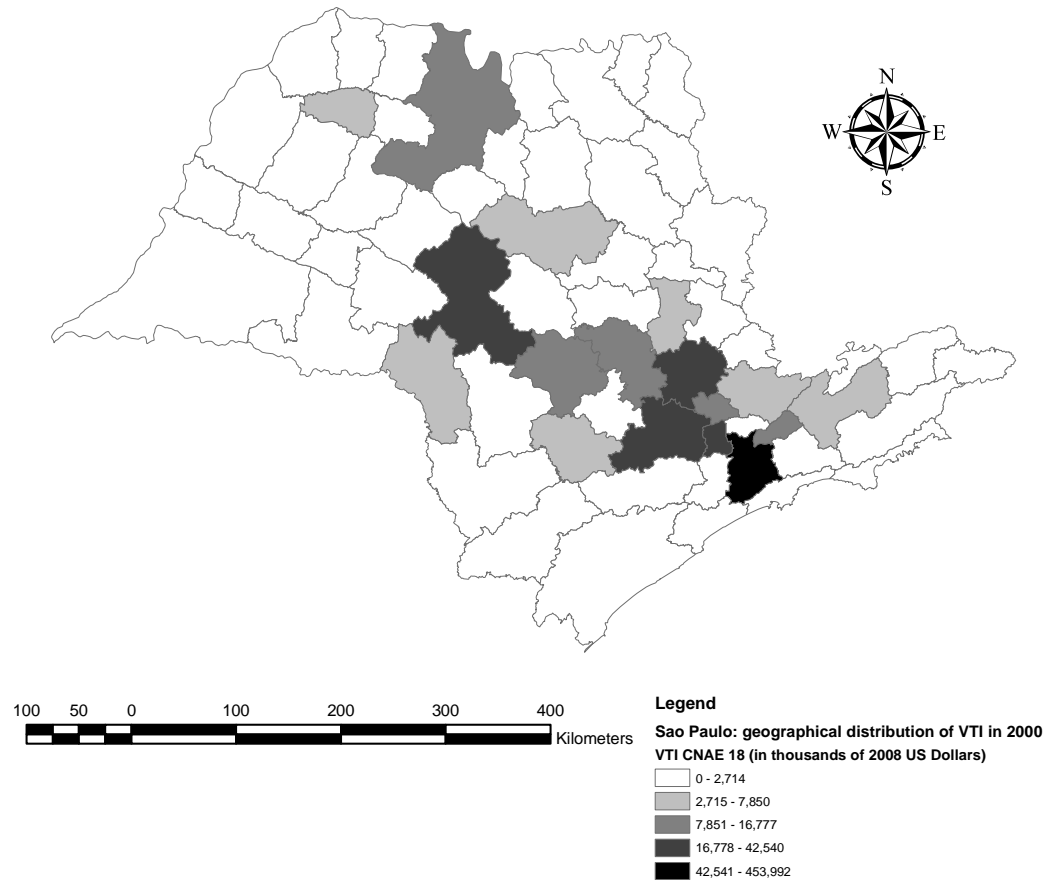
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



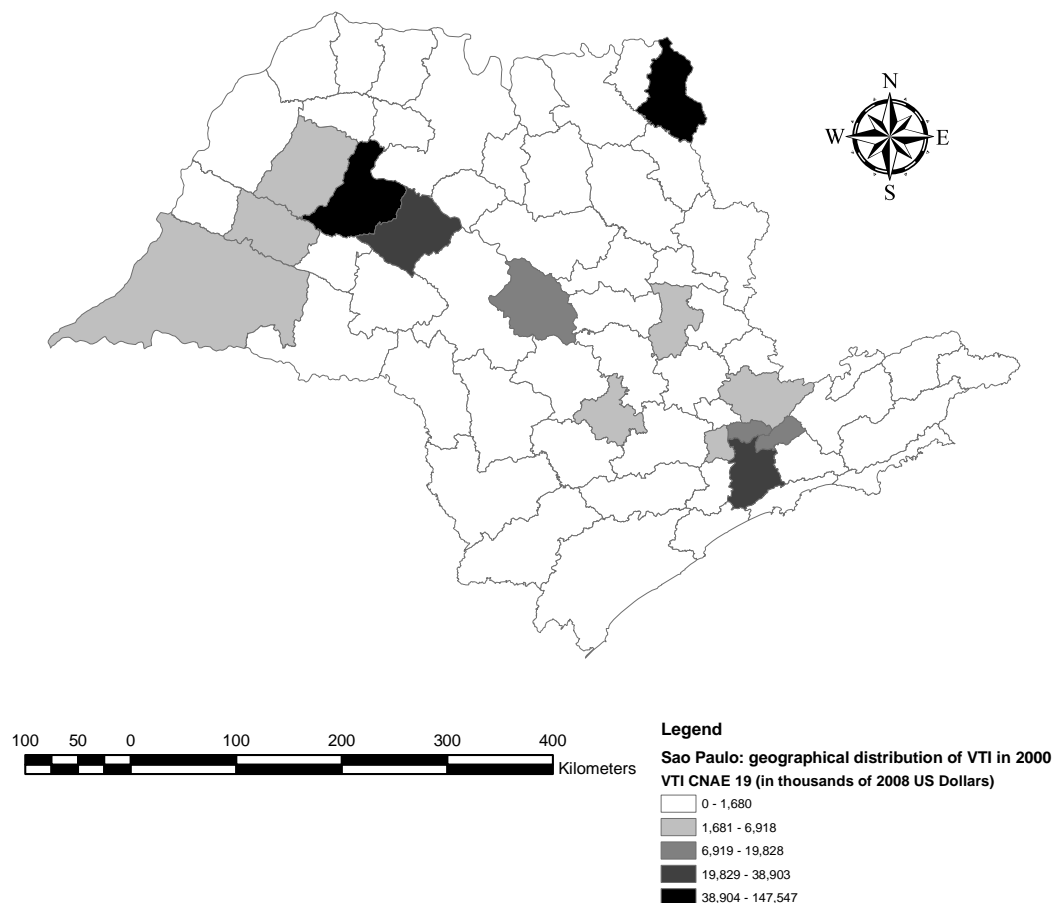
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel; dressing and dyeing of fur)**



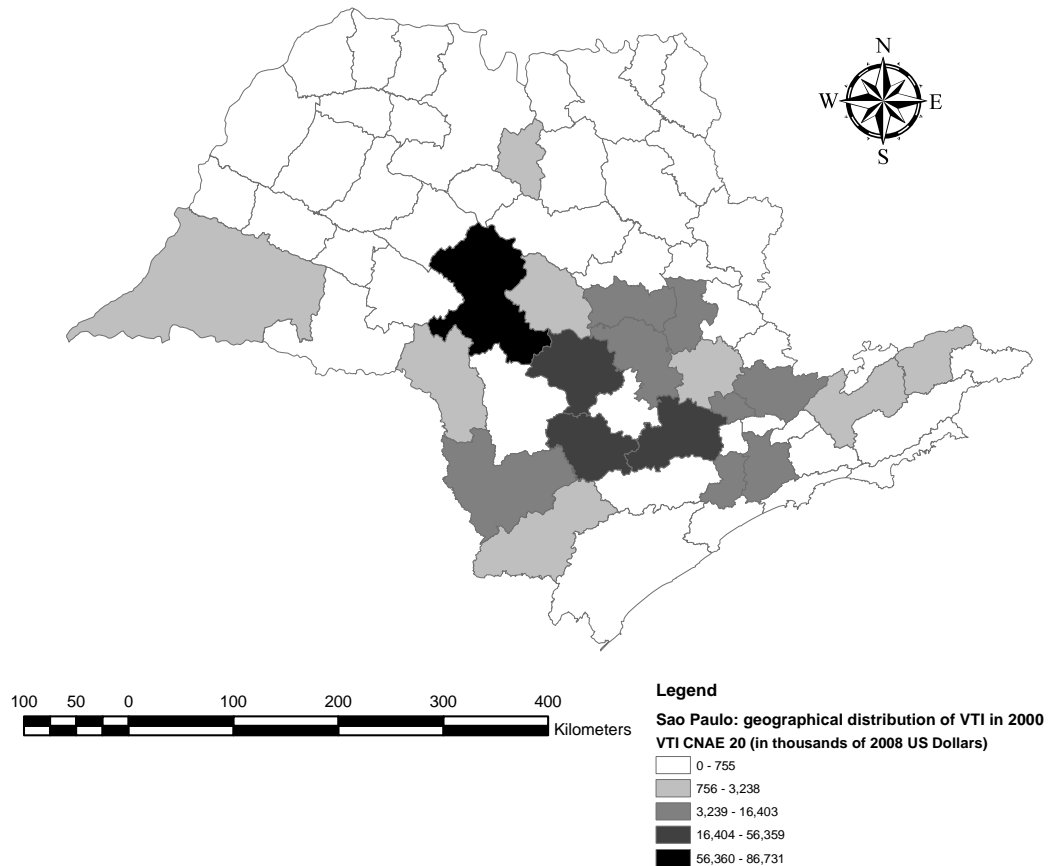
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of luggage, handbags,
saddlery, harness and footwear)**



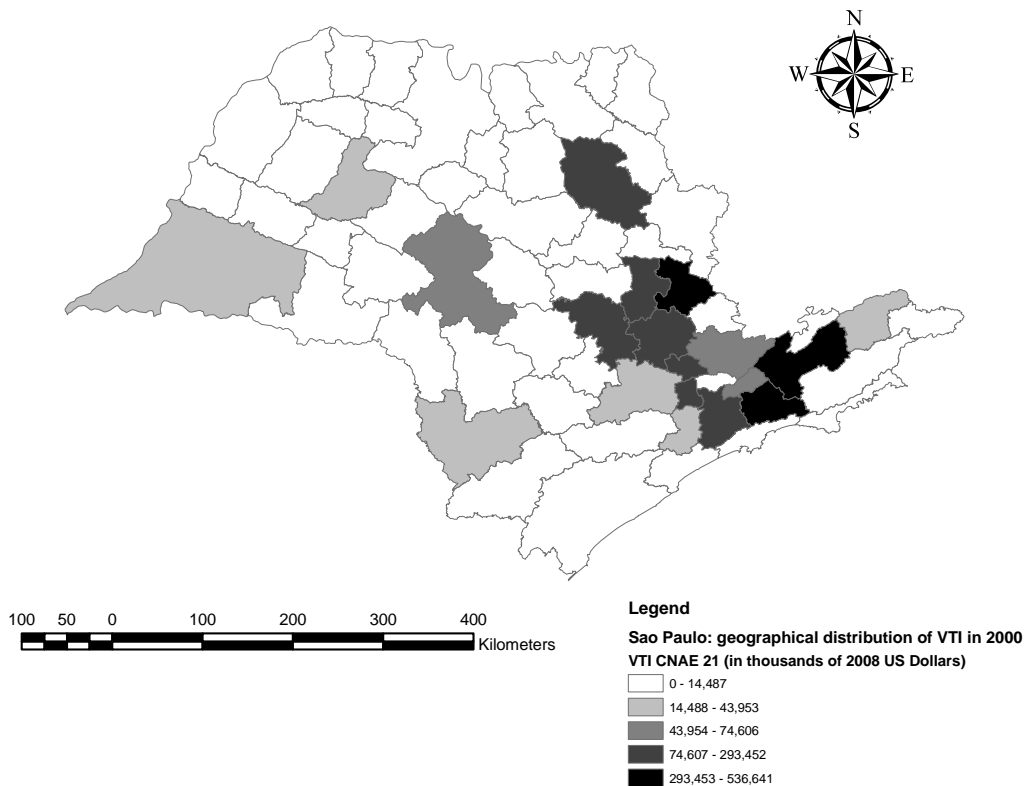
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products of
wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



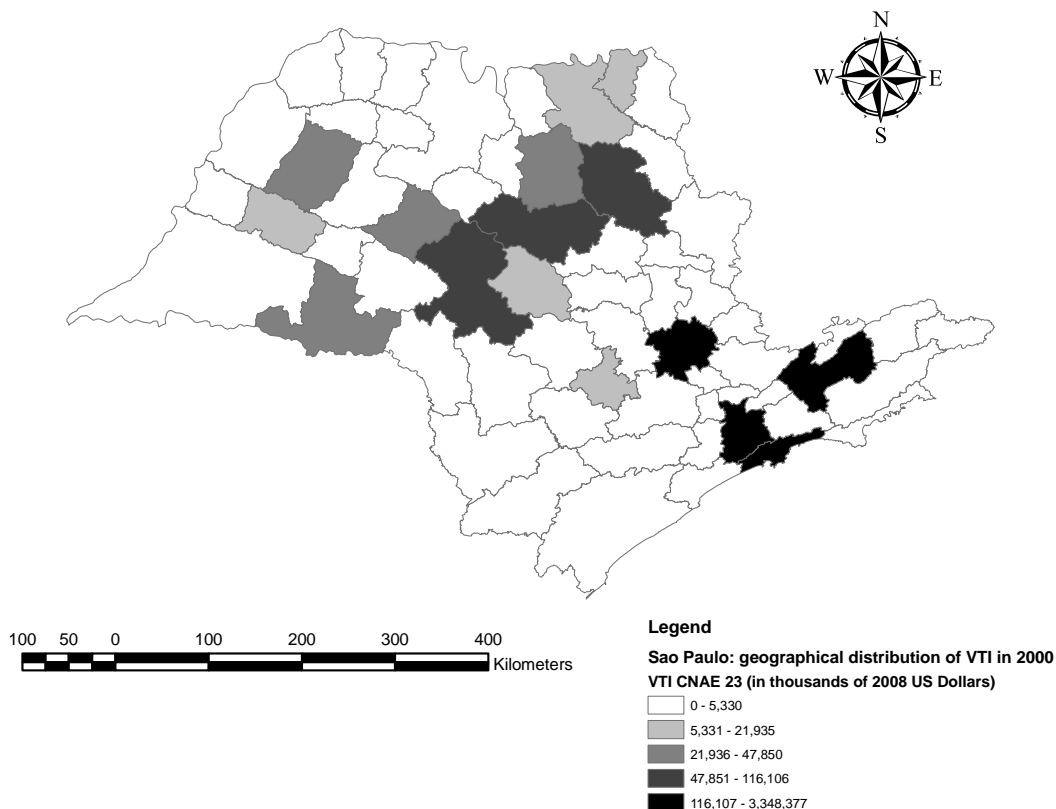
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

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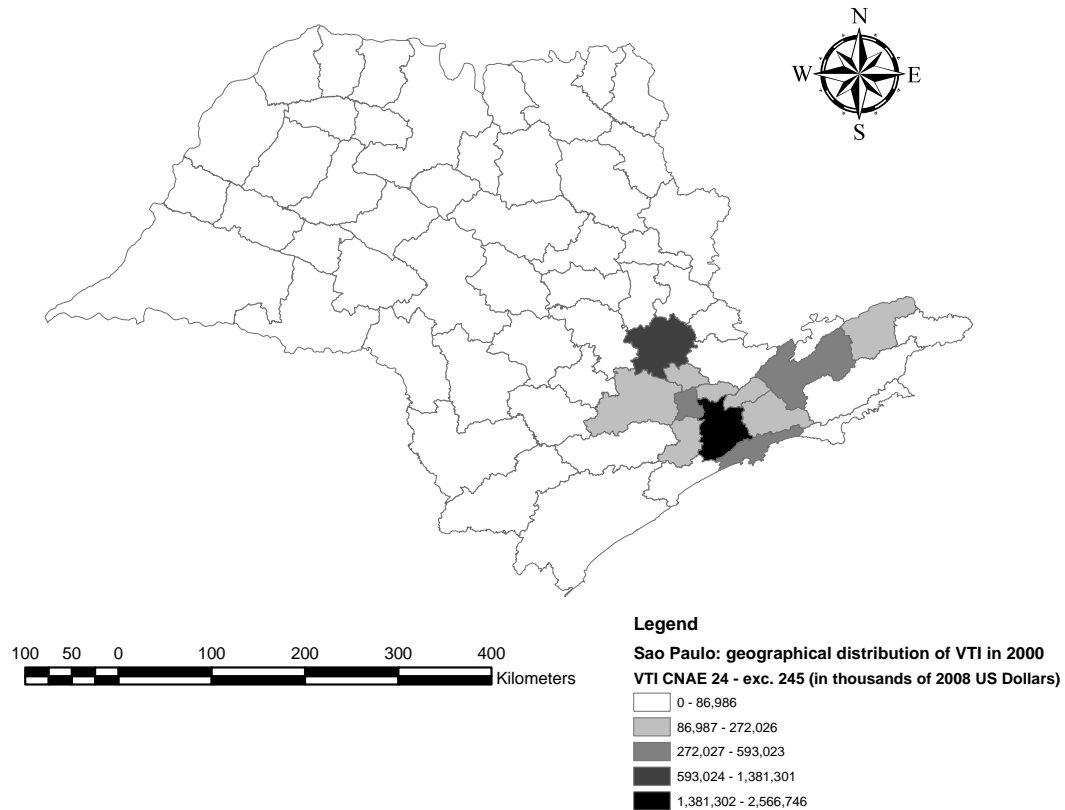
0 - 7,140
7,141 - 41,282
41,283 - 99,793
99,794 - 231,309
231,310 - 2,896,520

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum products and nuclear fuel)**



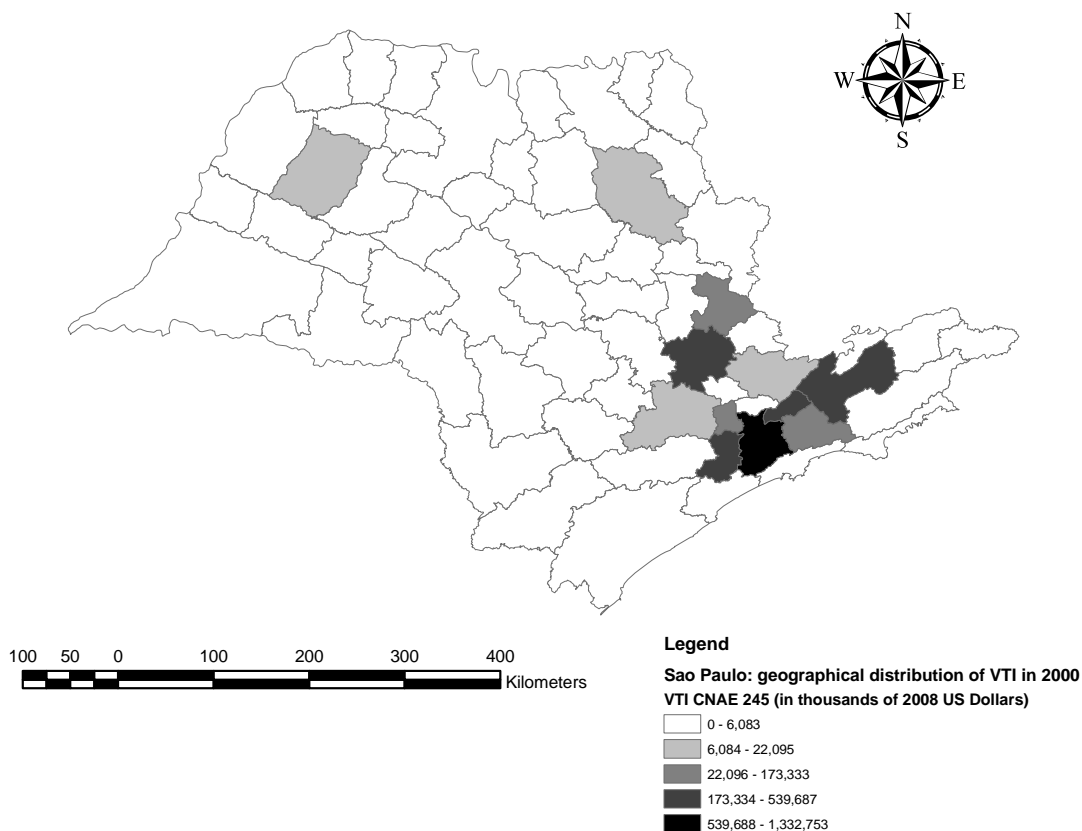
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE 24/ISIC (Rev.3) 24, exc. CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals, medicinal chemicals
and botanical products)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).

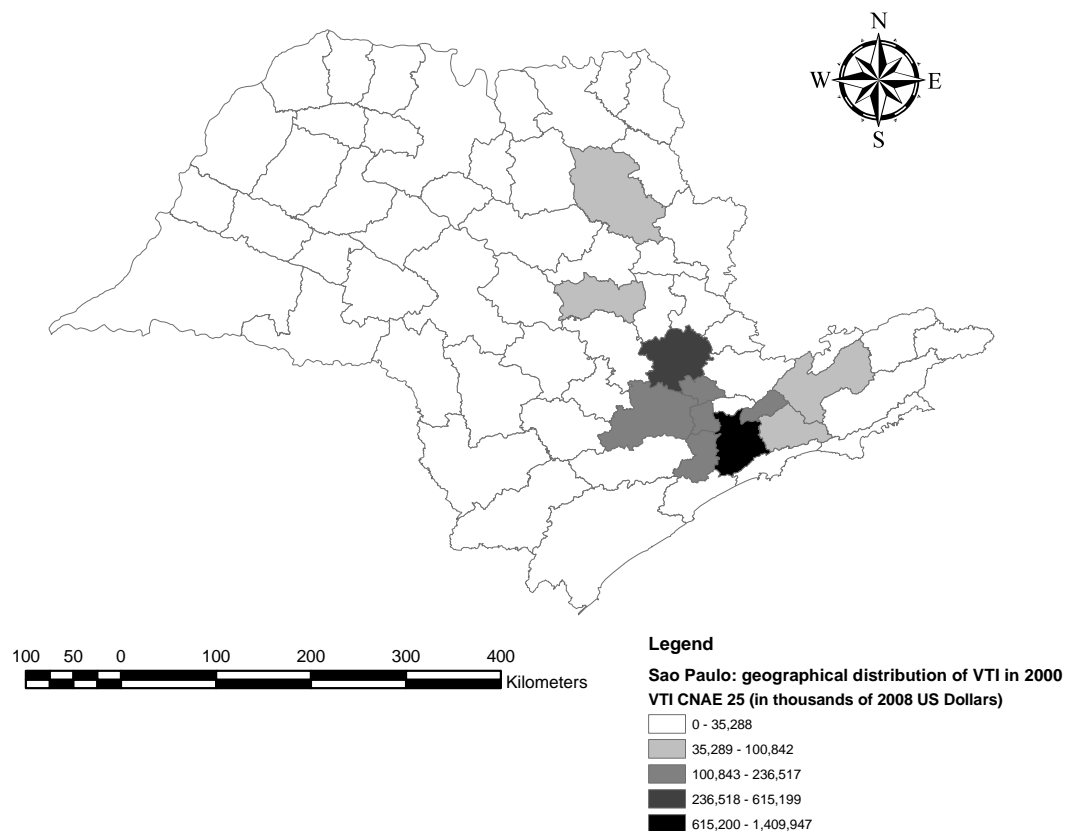
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal).

Geographic Coordinated System: South American Datum 1969.

Projected Coordinated System: UTM South American Zone 22S



**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).

Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).

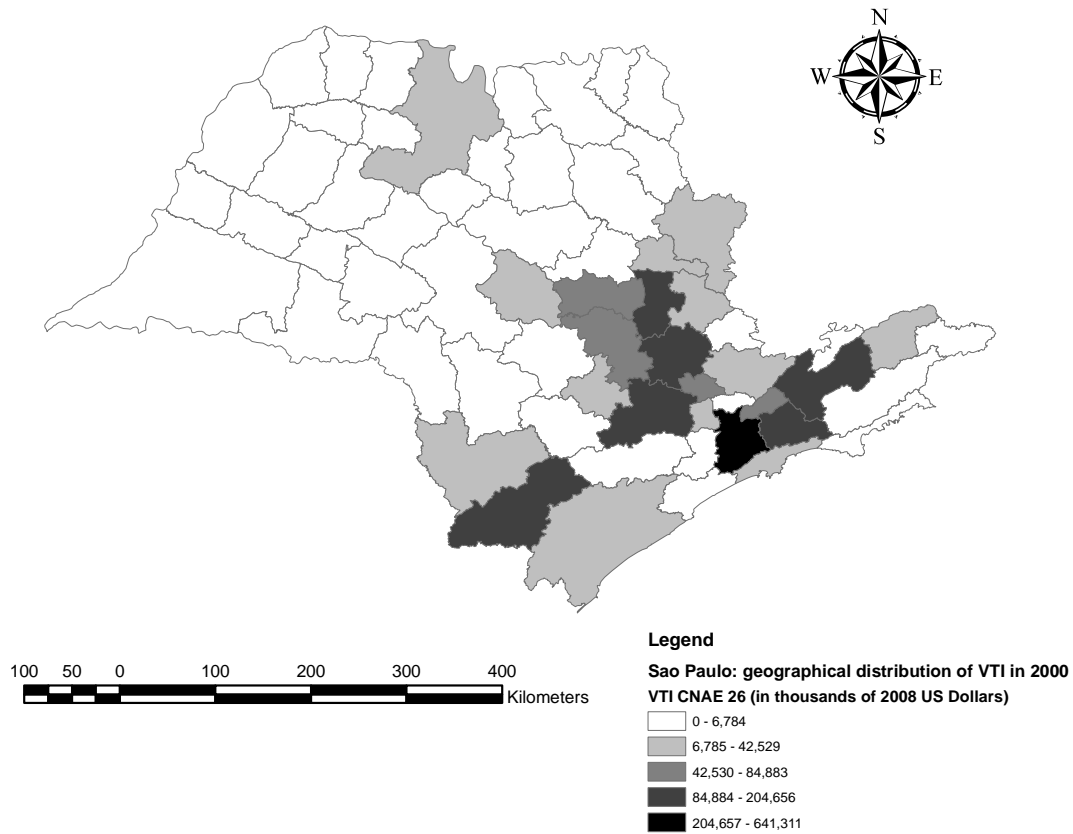
Geographic Coordinated System: South American Datum 1969.

Projected Coordinated System: UTM South American Zone 22S

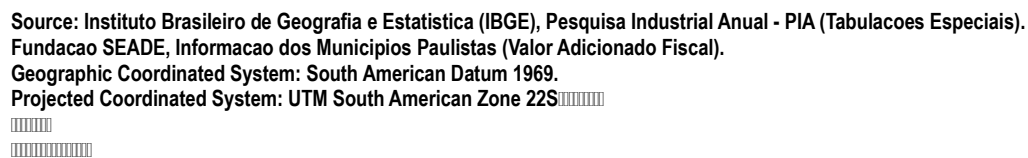
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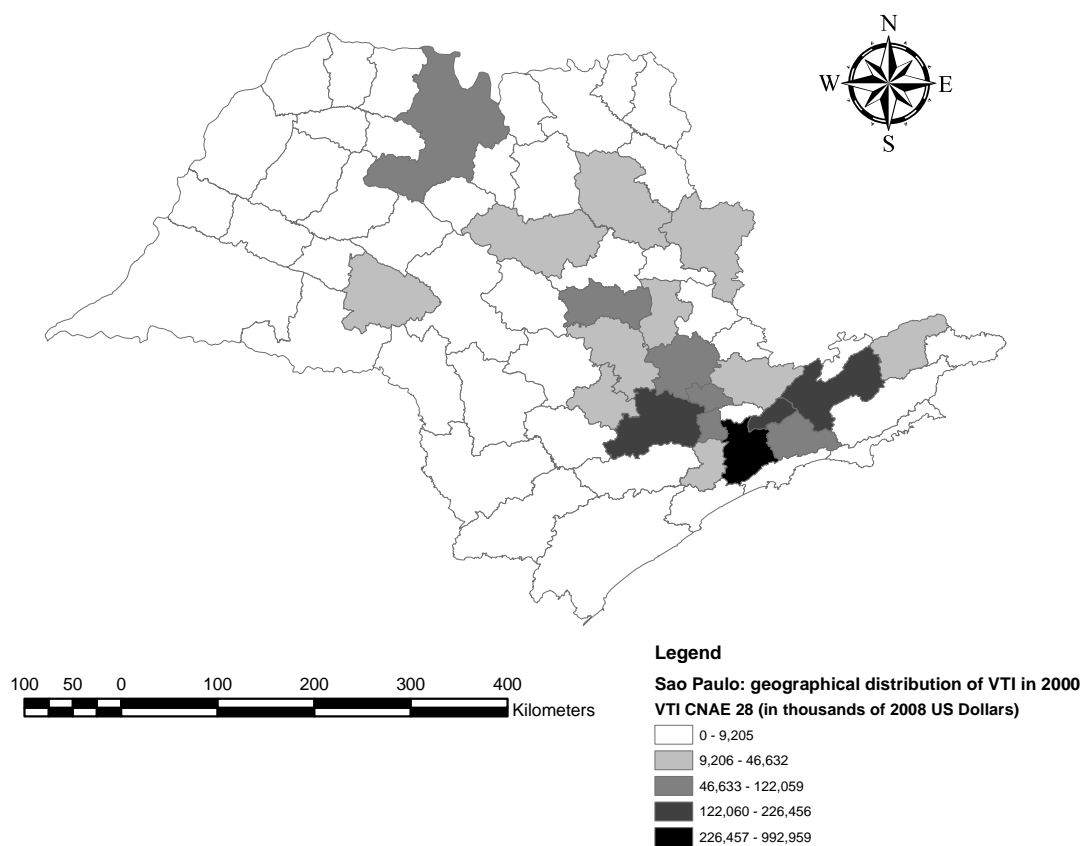
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S



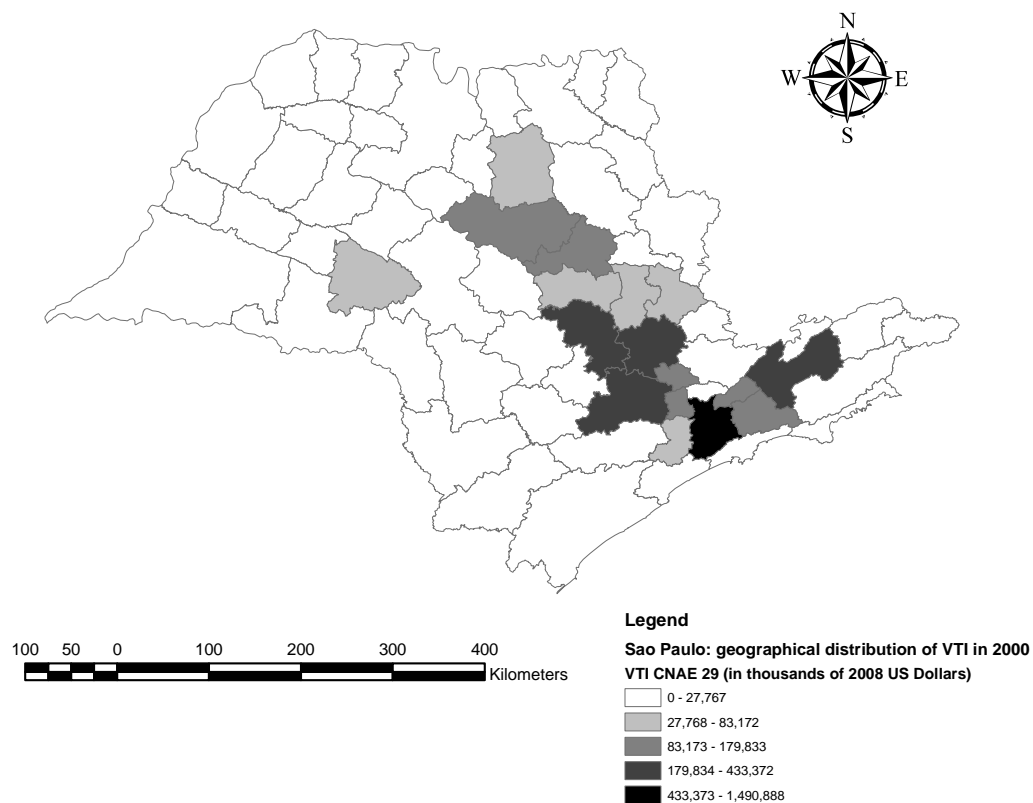
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

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**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



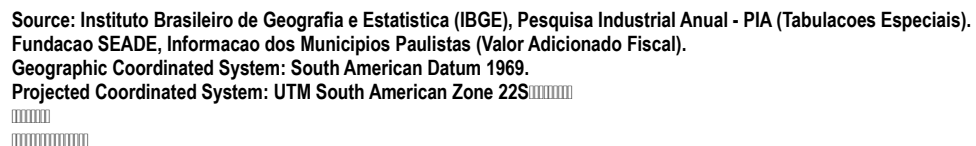
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).

Geographic Coordinated System: South American Datum 1969.

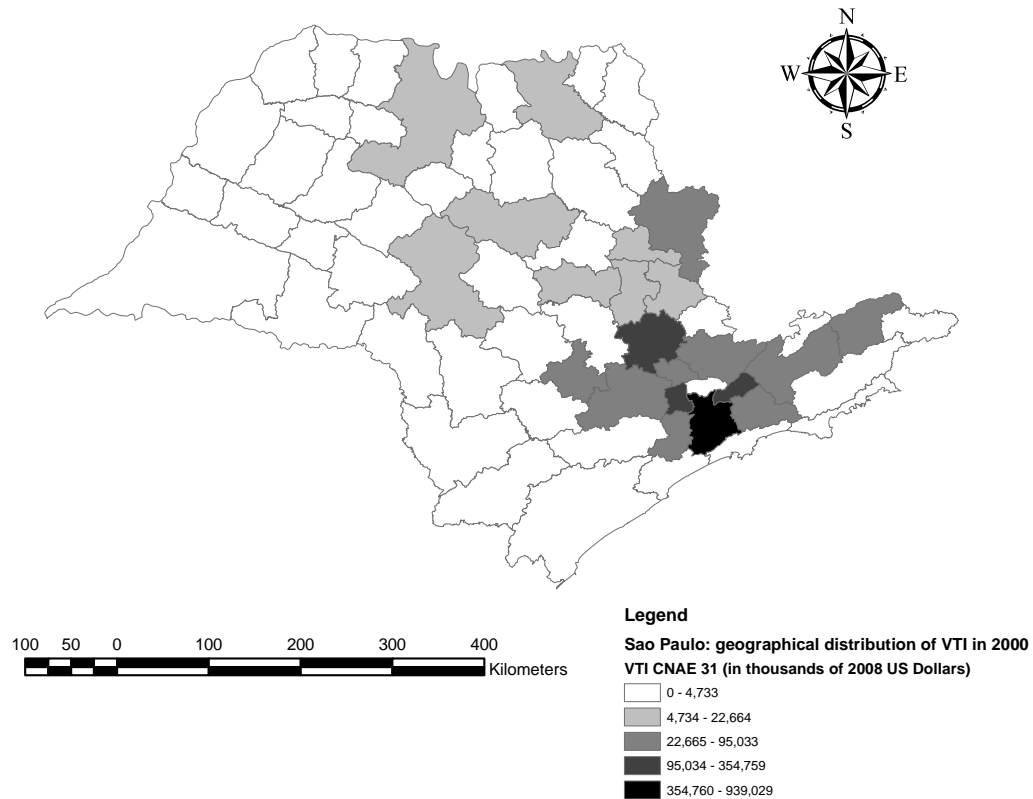
Projected Coordinated System: UTM South American Zone 22S

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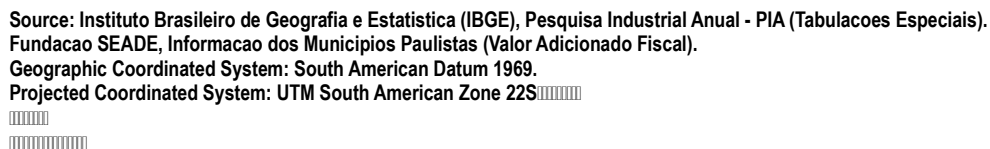


**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**

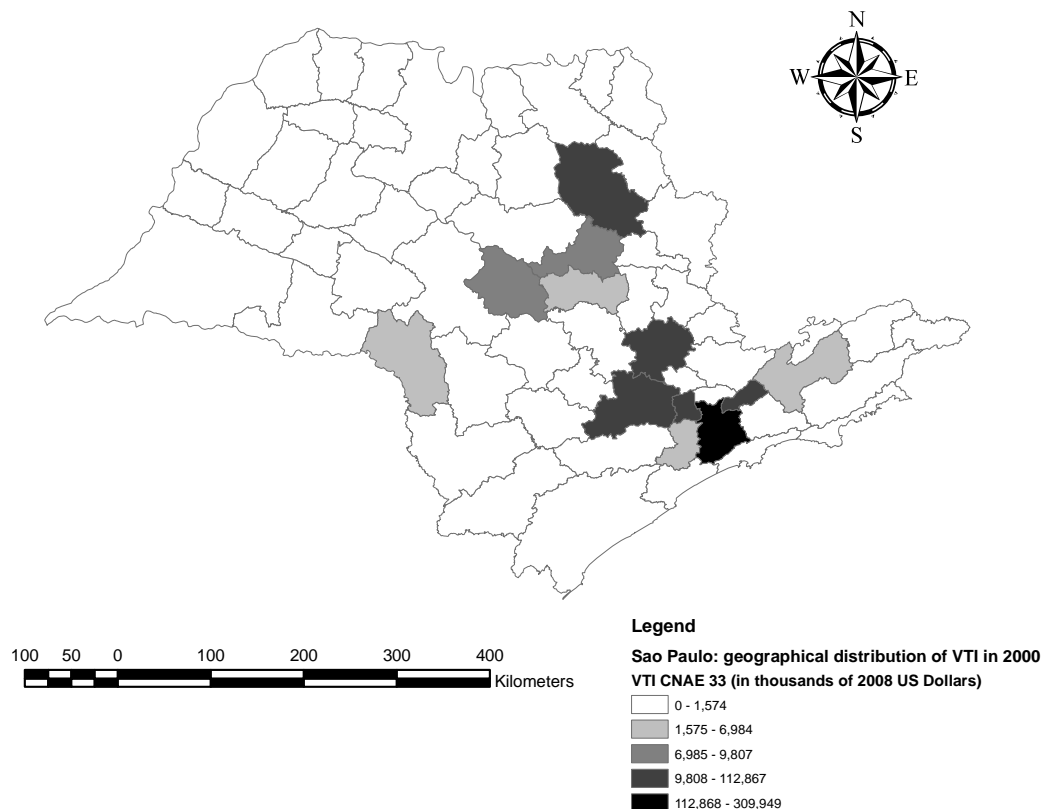


Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

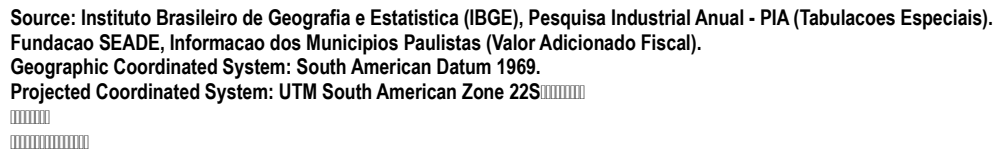
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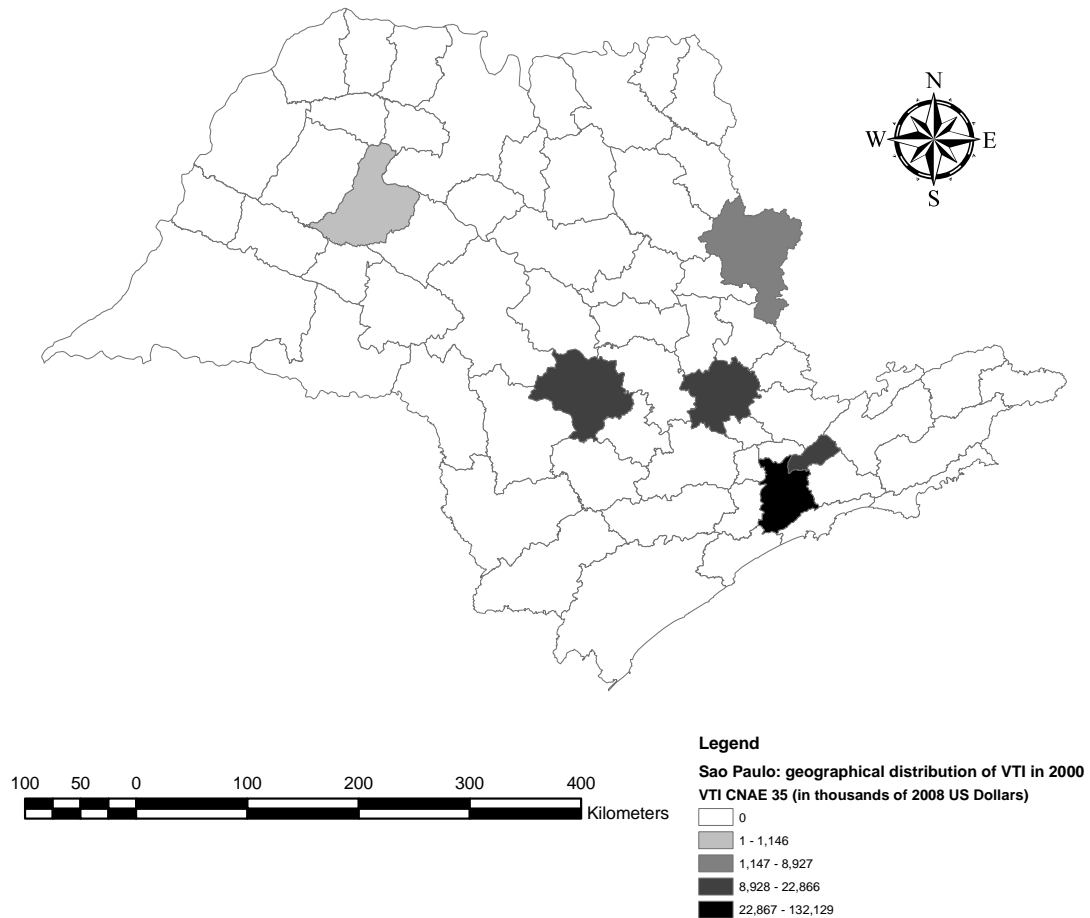
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision and
optical instruments, watches and clocks)**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S

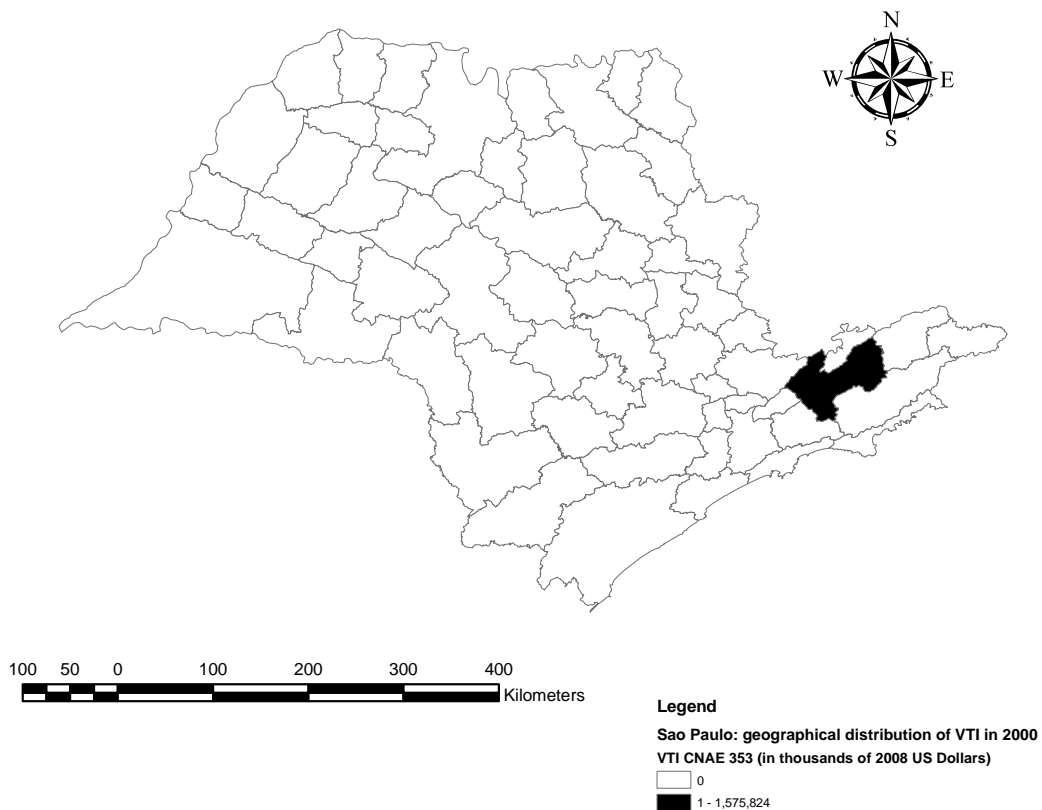


**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev. 3) 353
(Manufacture of other transport equipment)**

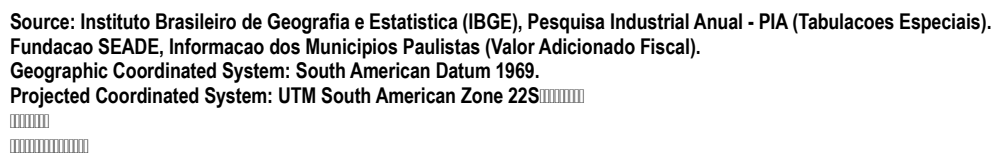


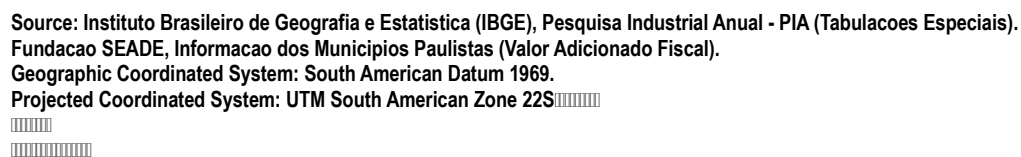
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
CNAE 353/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**

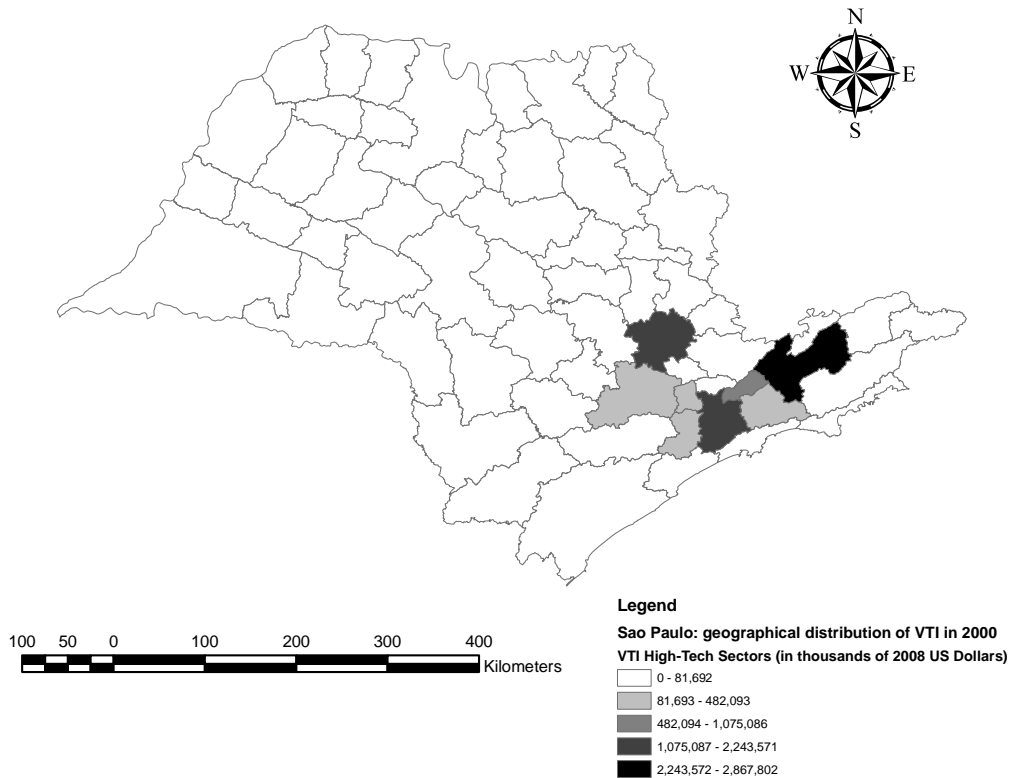


Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).
Geographic Coordinated System: South American Datum 1969.
Projected Coordinated System: UTM South American Zone 22S





Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2000 High Tech Sectors (1)



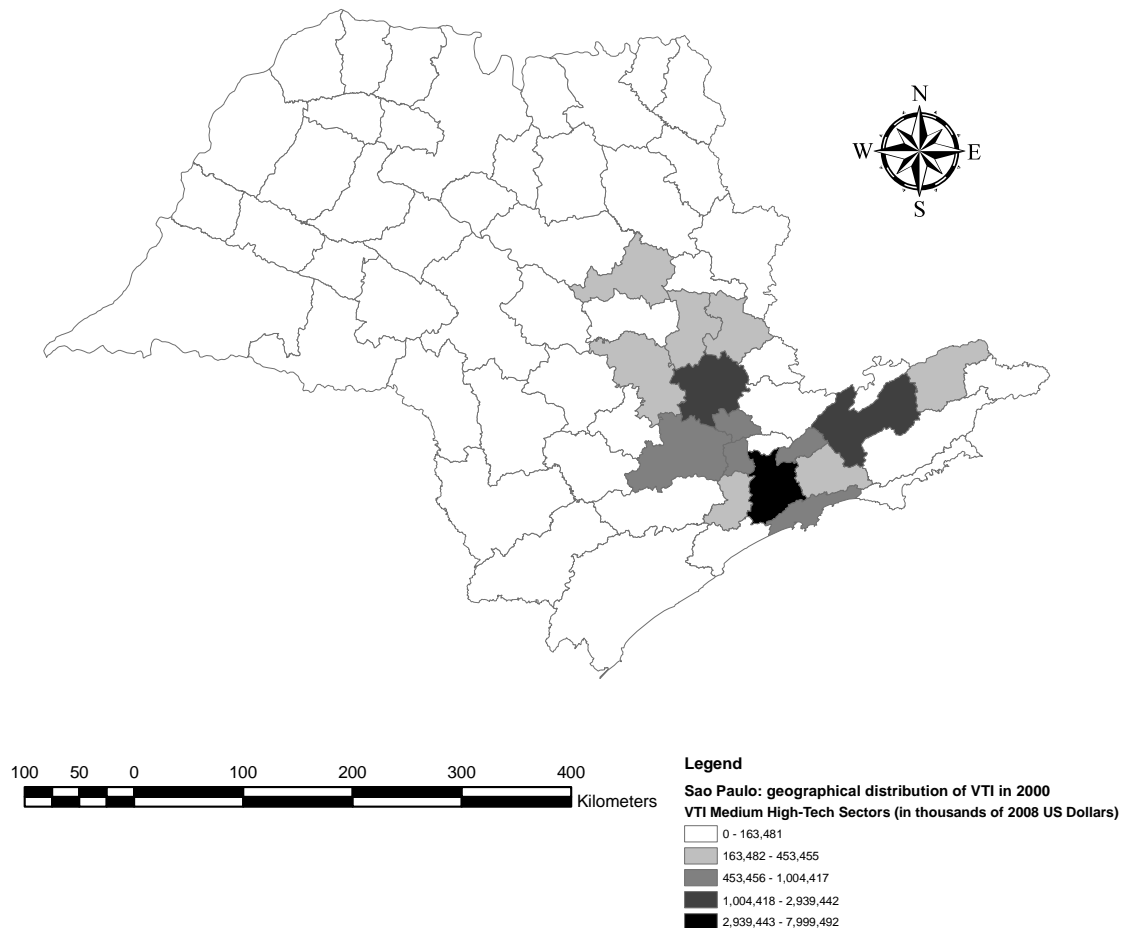
(1) High Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais). Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal).

Geographic Coordinated System: South American Datum 1969.

Projected Coordinated System: UTM South American Zone 22S

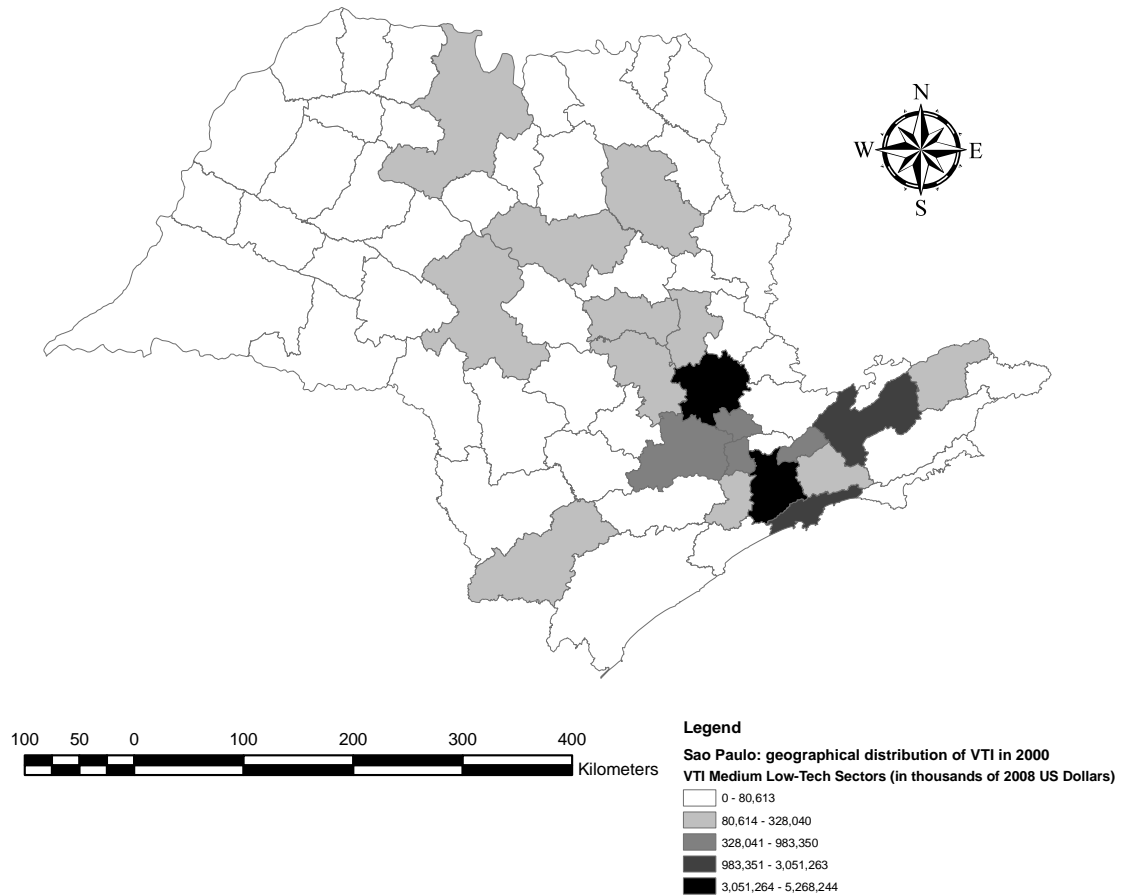
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2000
Medium High-Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

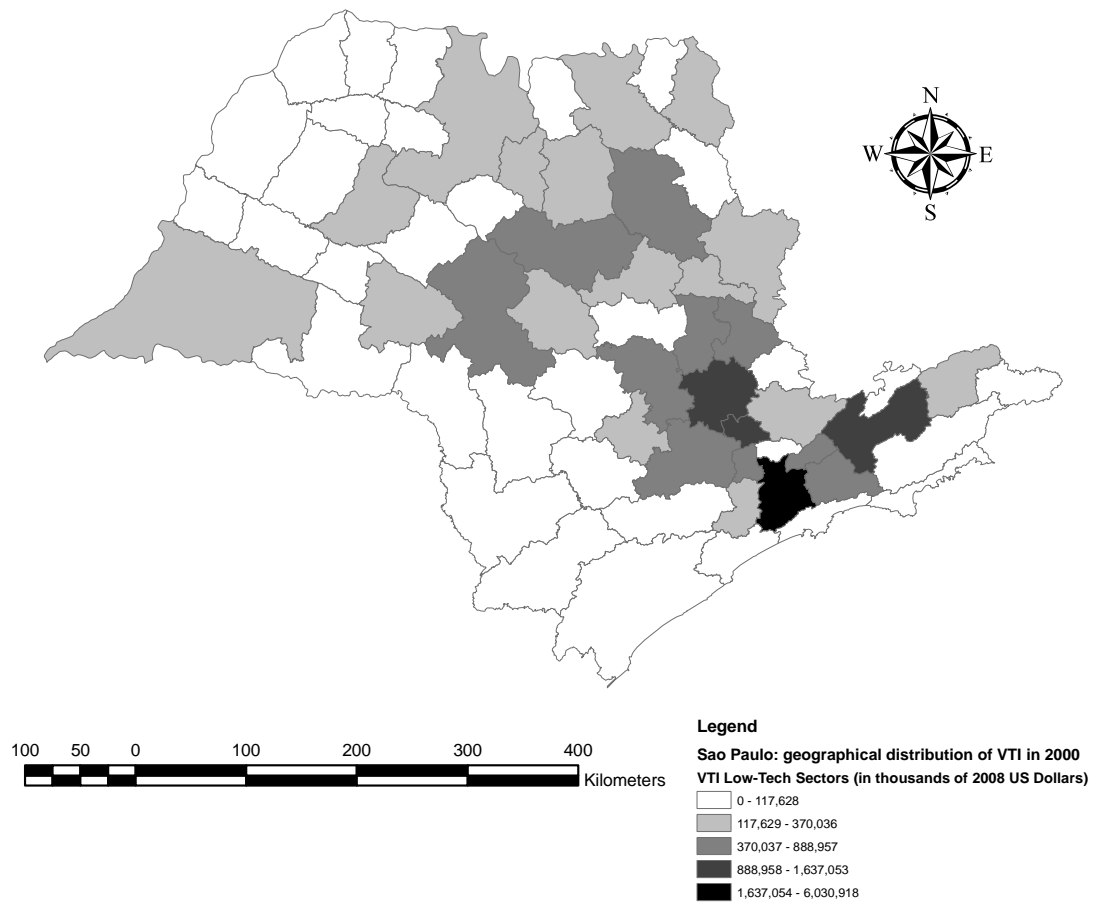
Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2000 Medium Low-Tech Sectors (1)



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

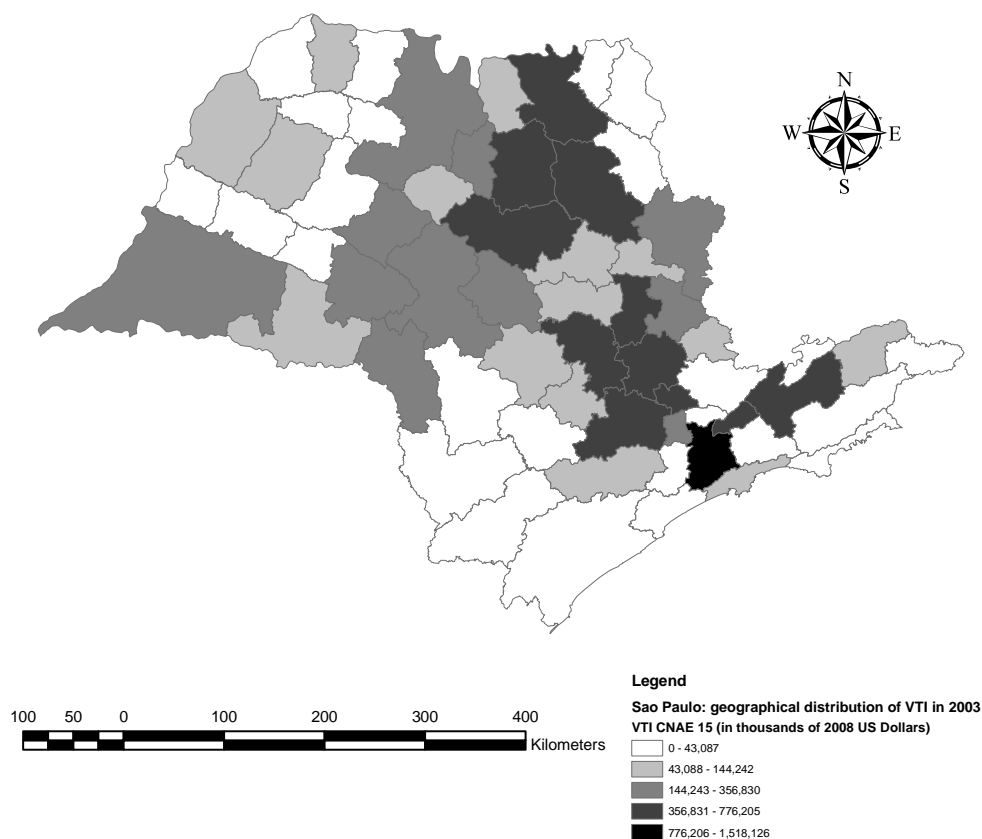
Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2000 Low-Tech Sectors (1)



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

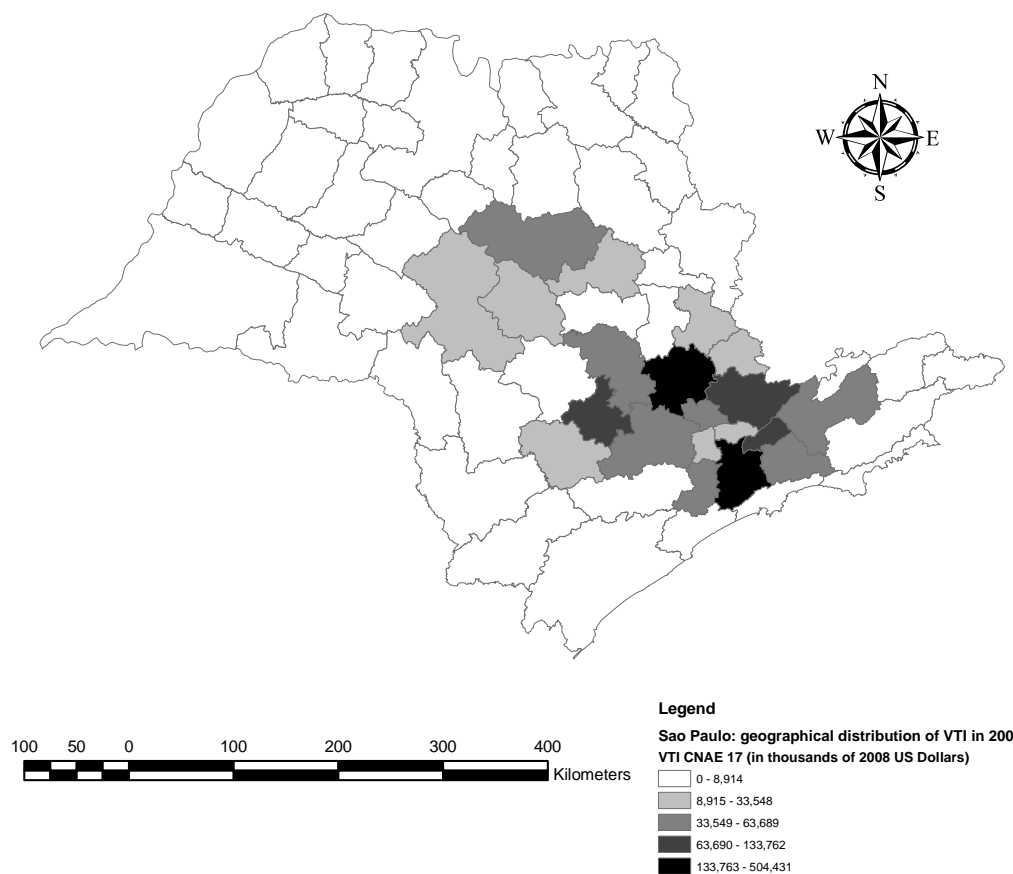
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



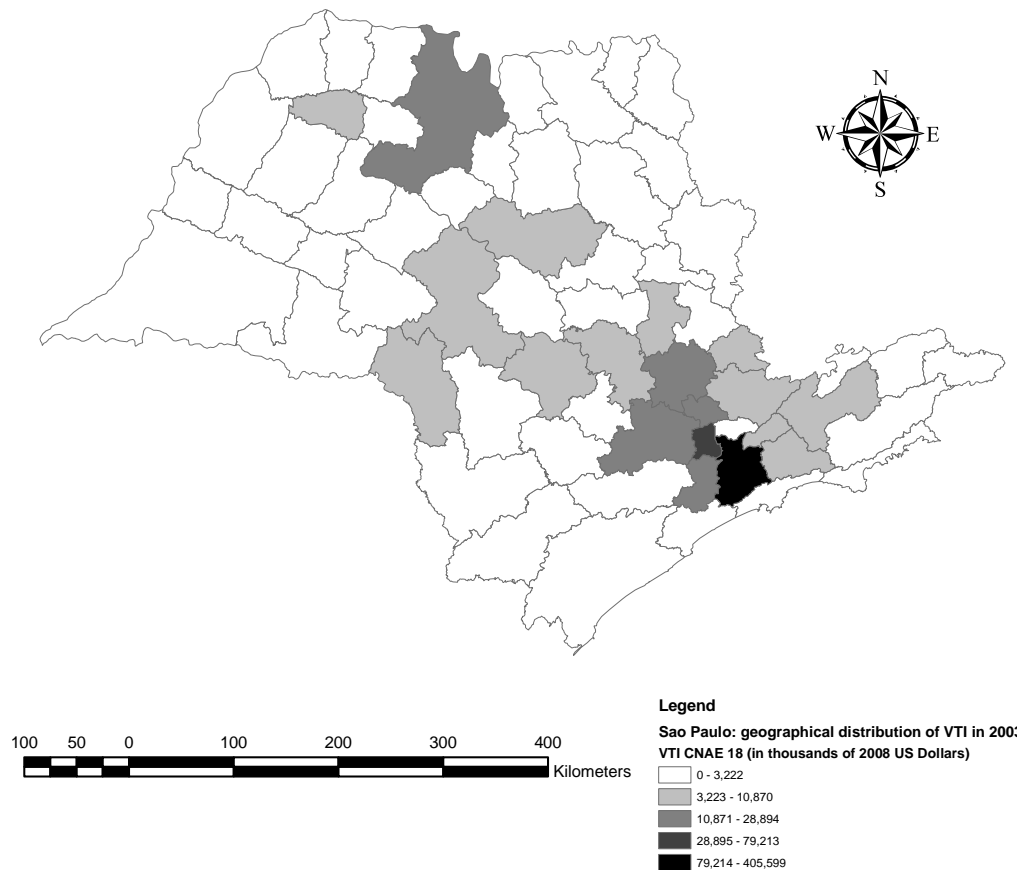
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



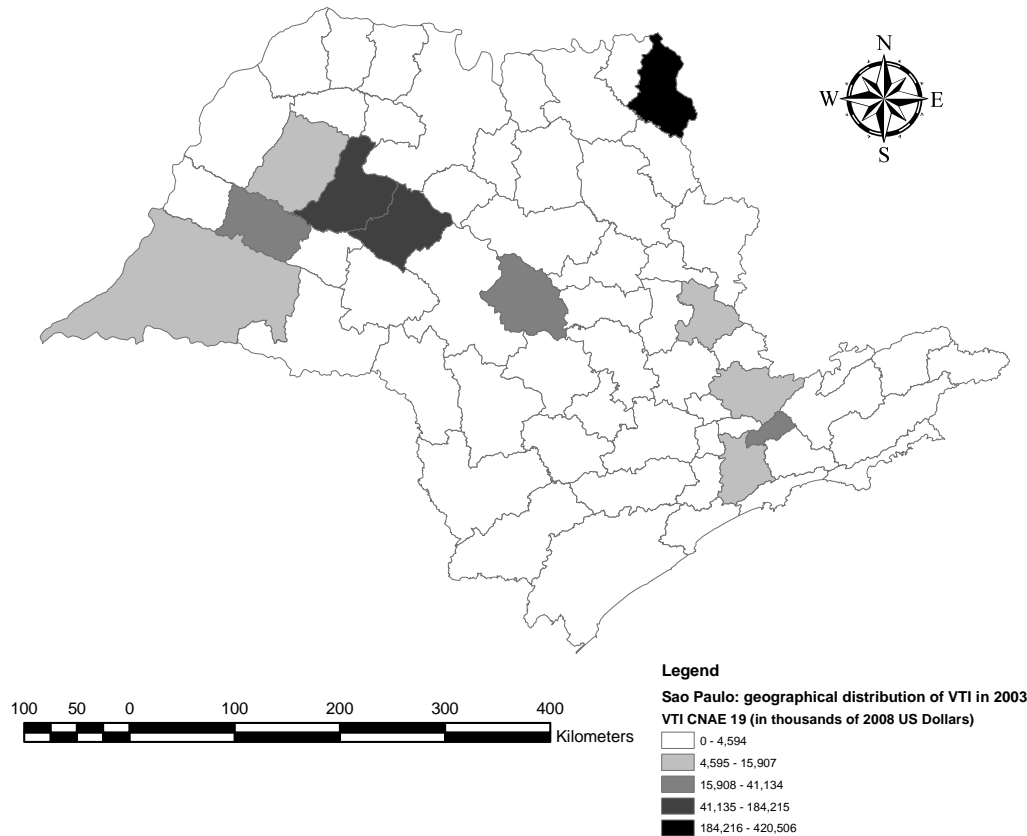
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel; dressing and dyeing of fur)**



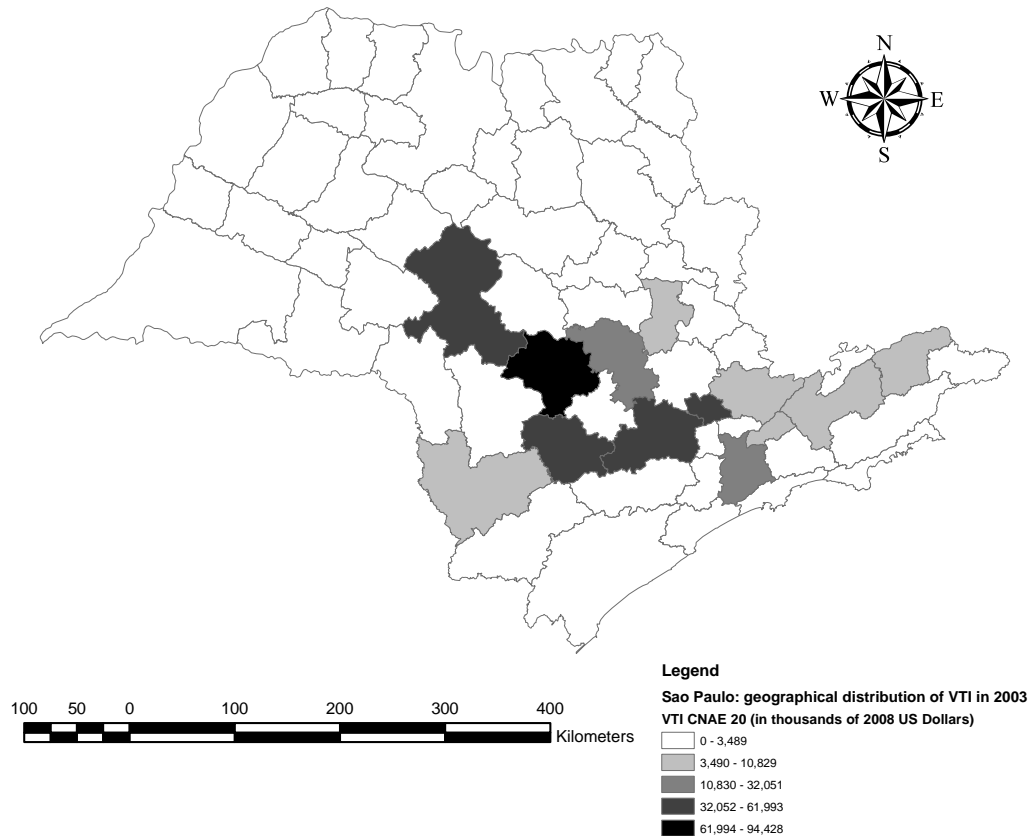
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather;
manufacture of luggage, handbags, saddlery,
harness and footwear)**



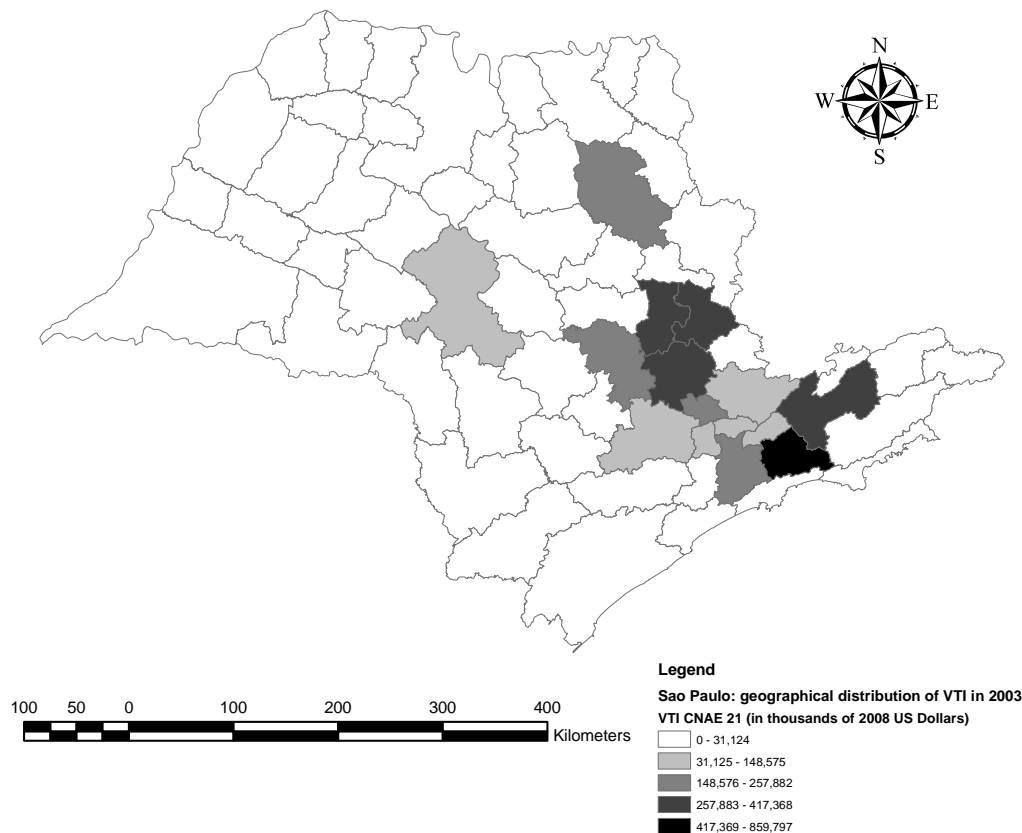
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products of
wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



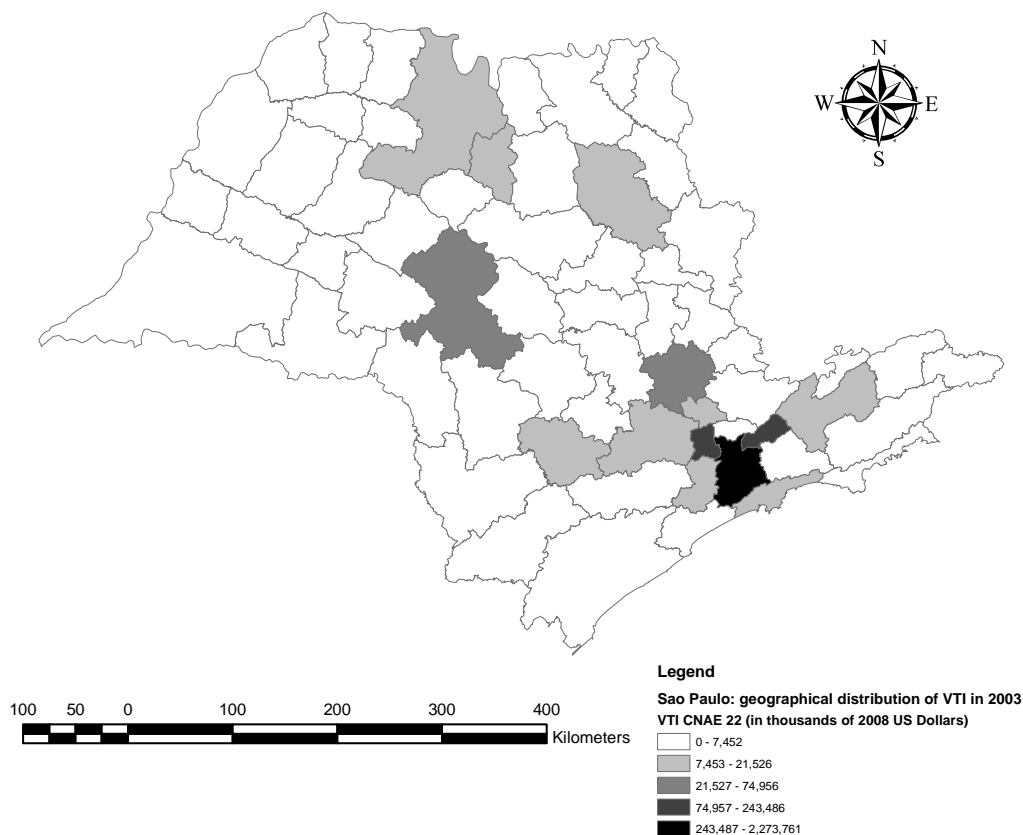
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



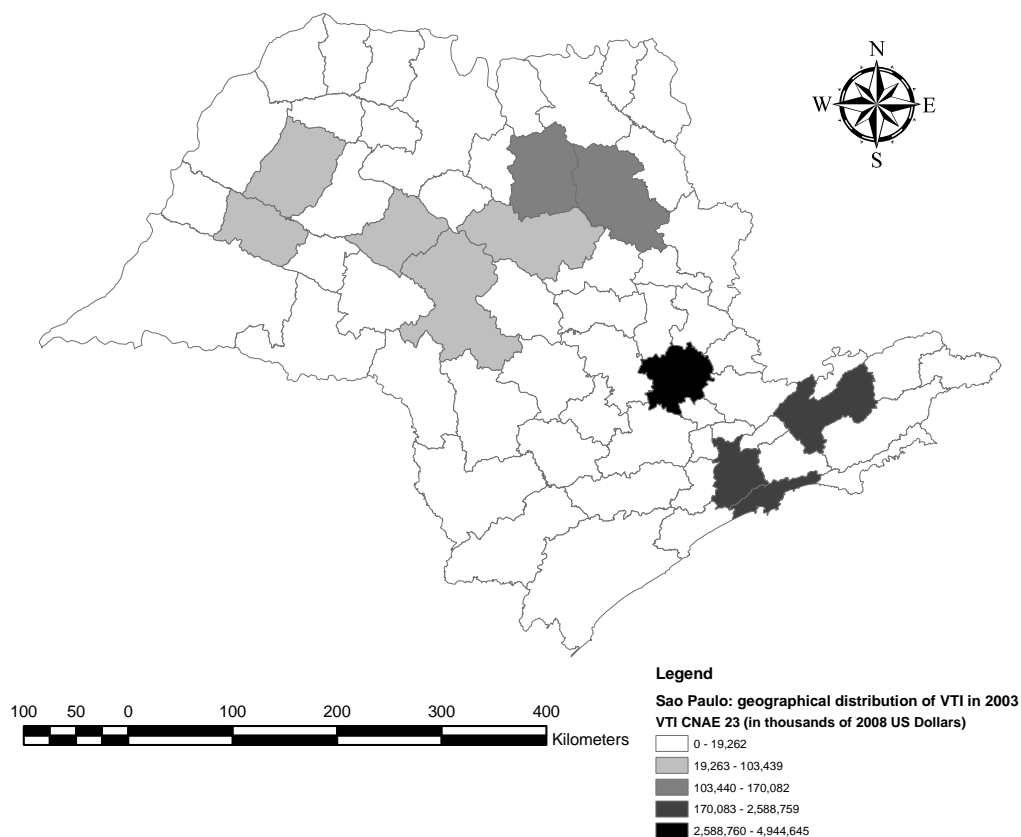
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



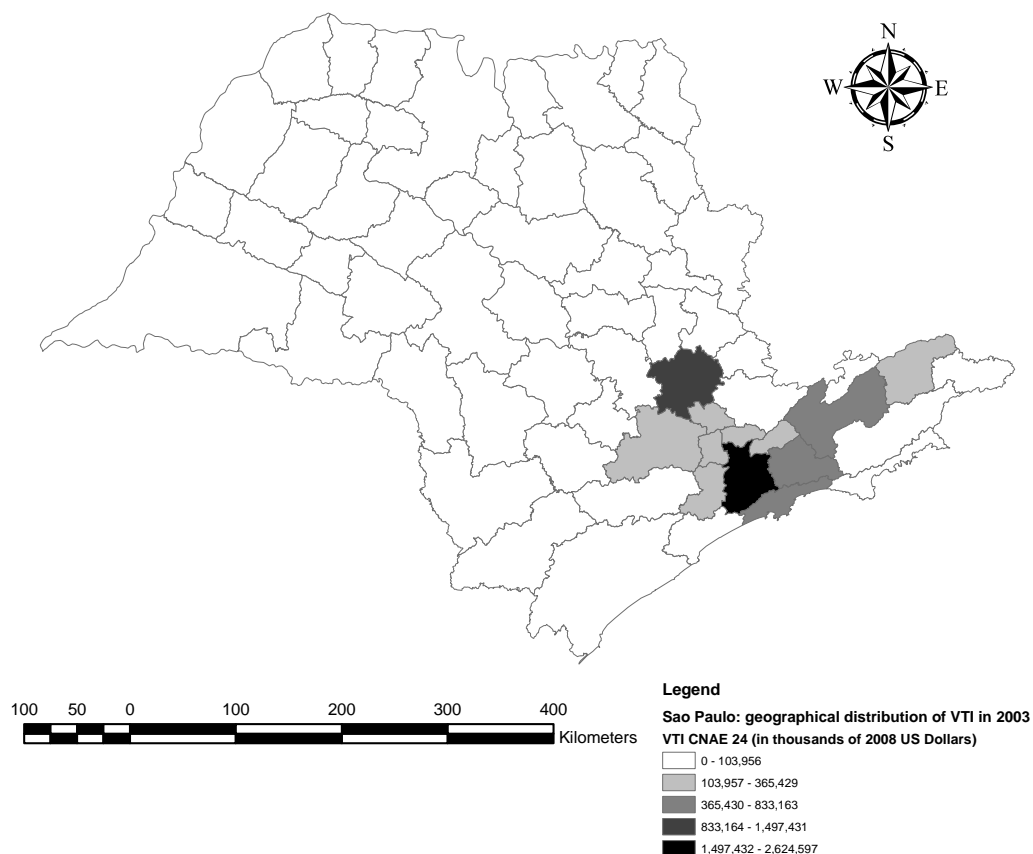
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum products and nuclear fuel)**



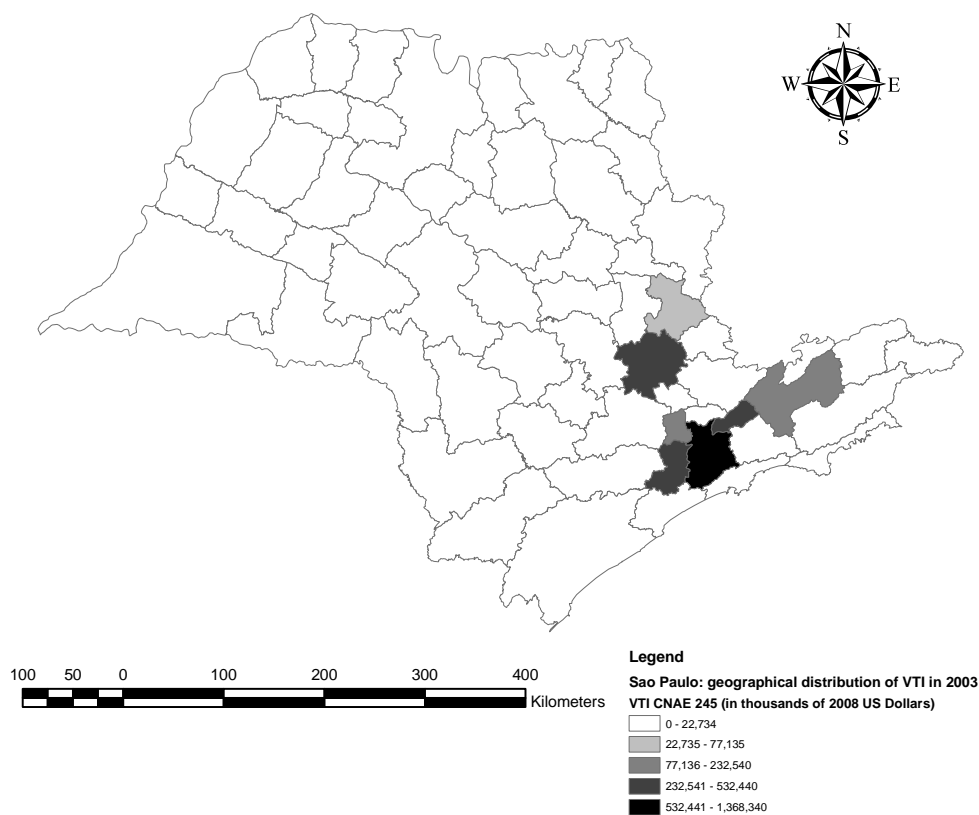
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

***Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 24, exc. CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)***



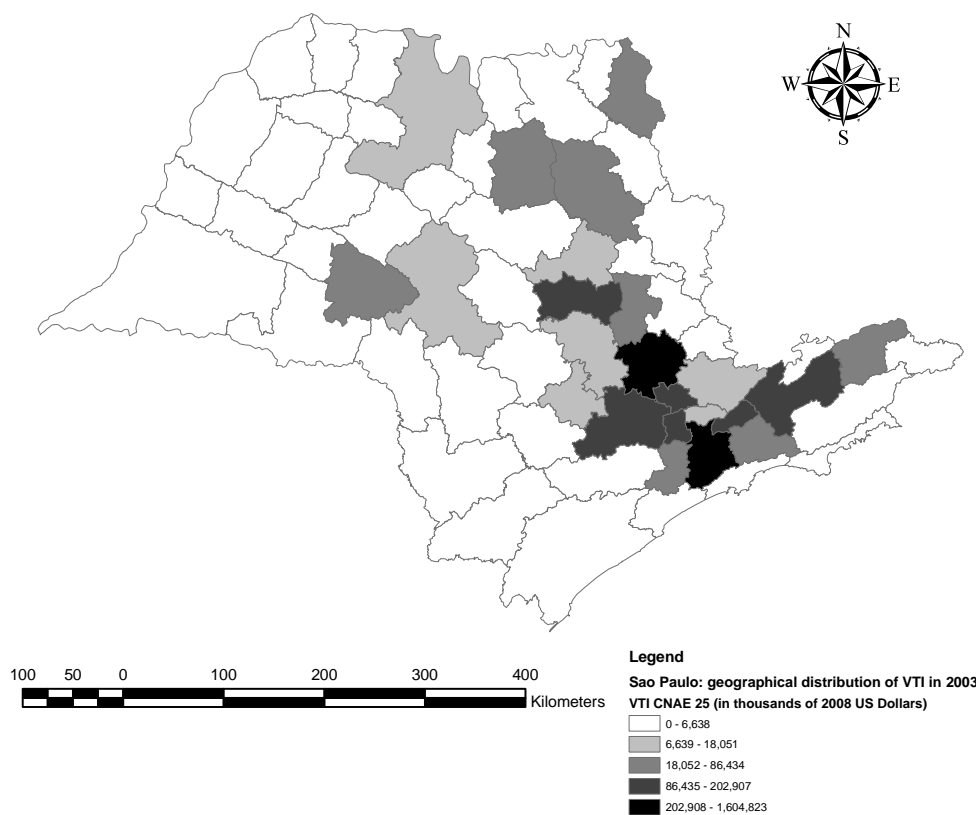
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



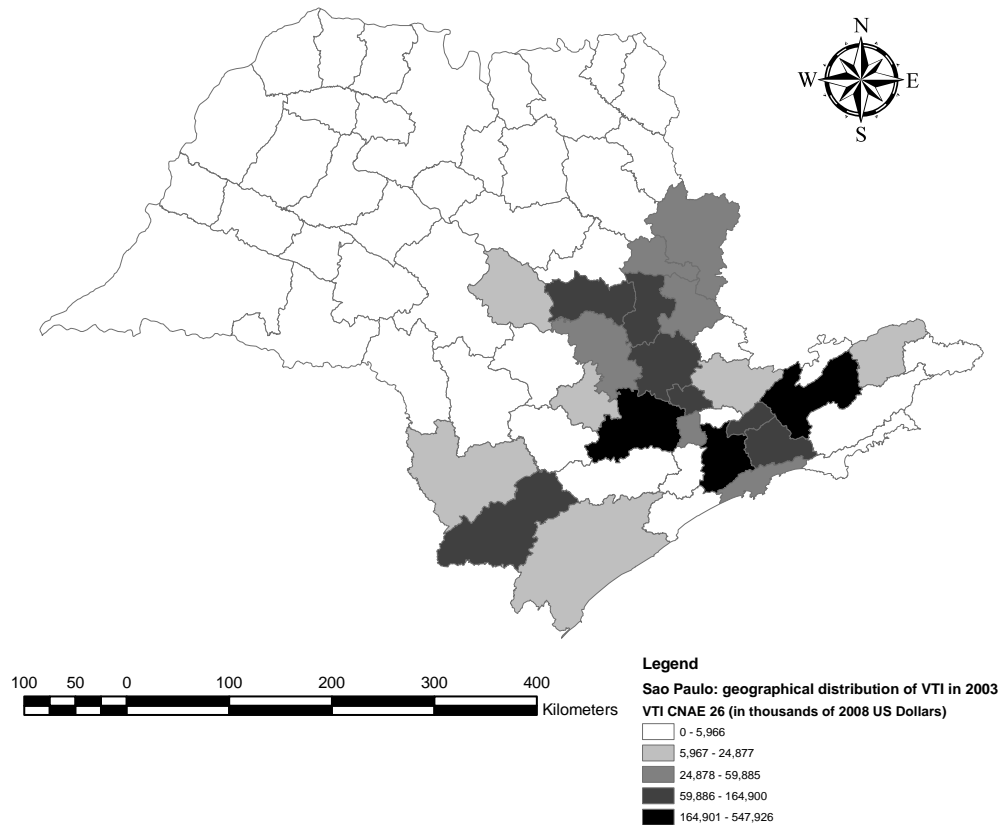
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



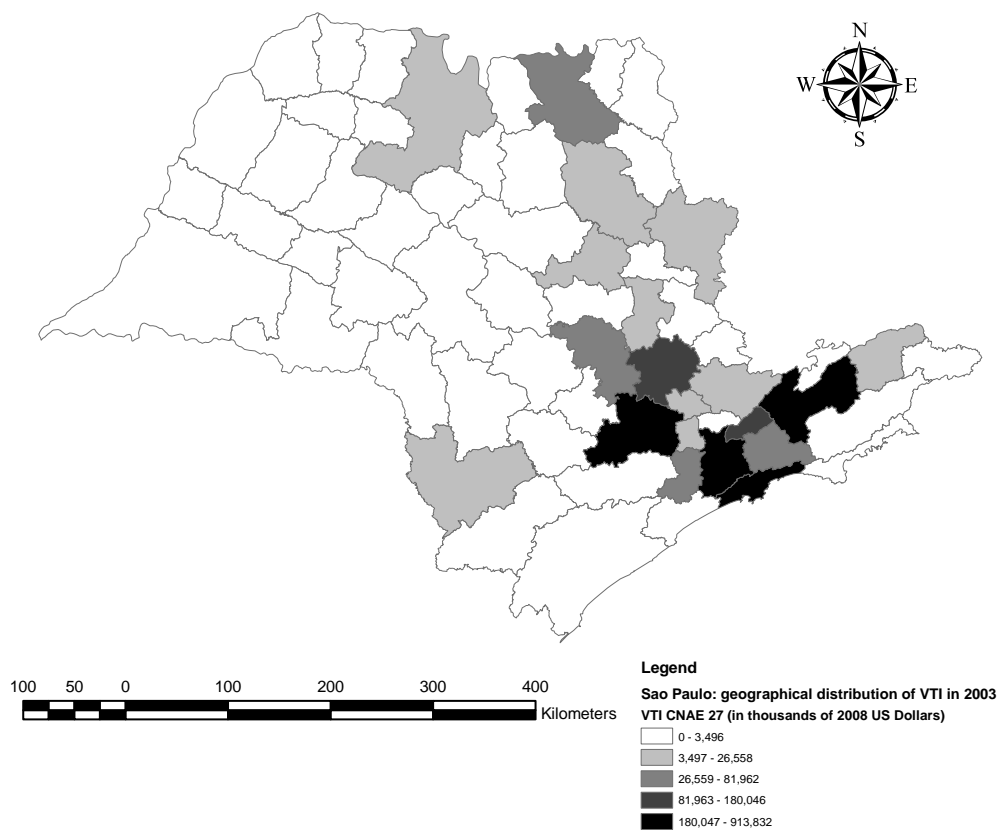
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



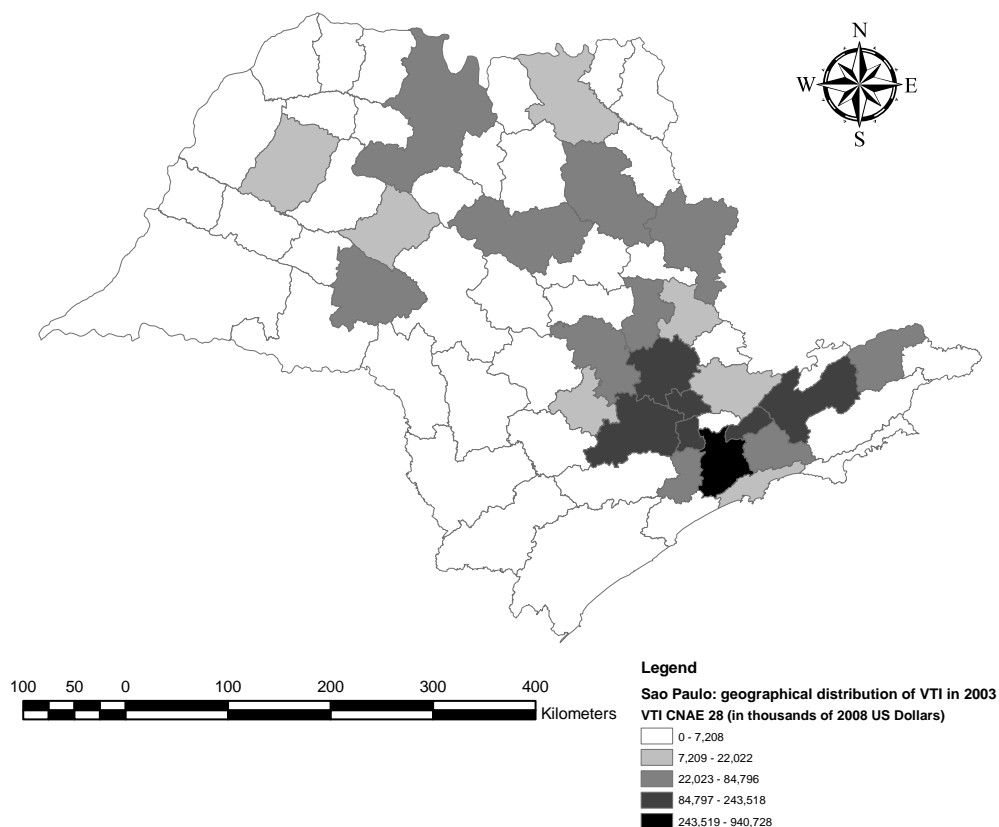
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
 Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
 Geographic Coordinated System: South American Datum 1969
 Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



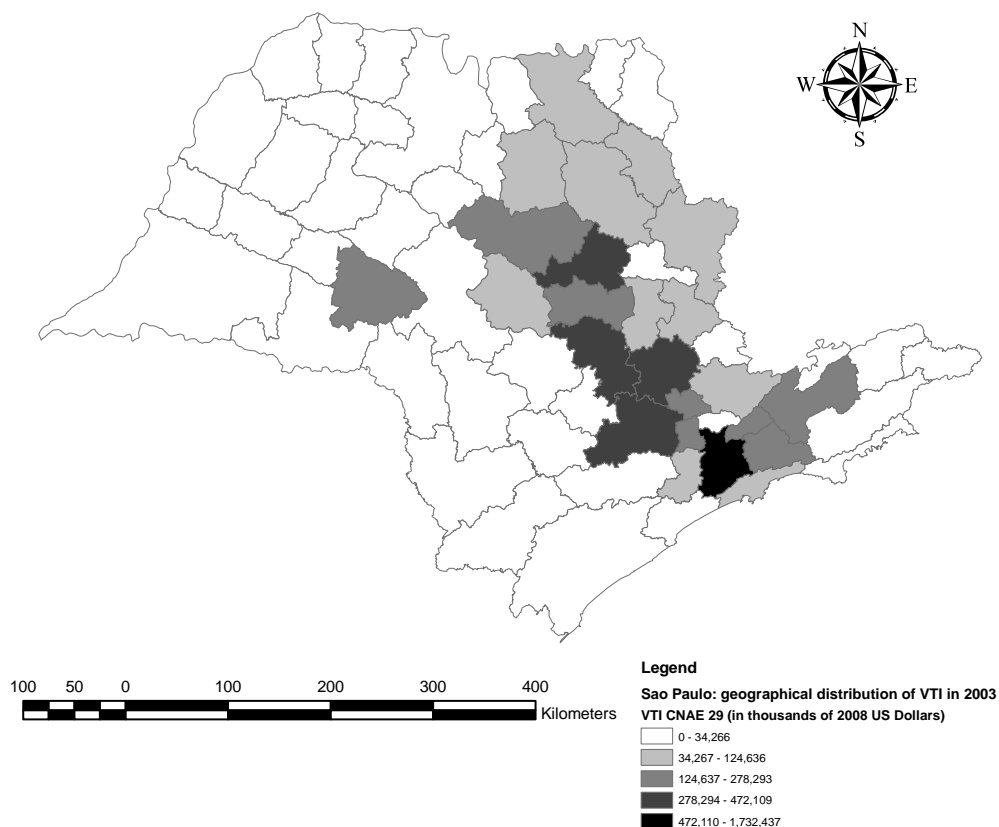
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



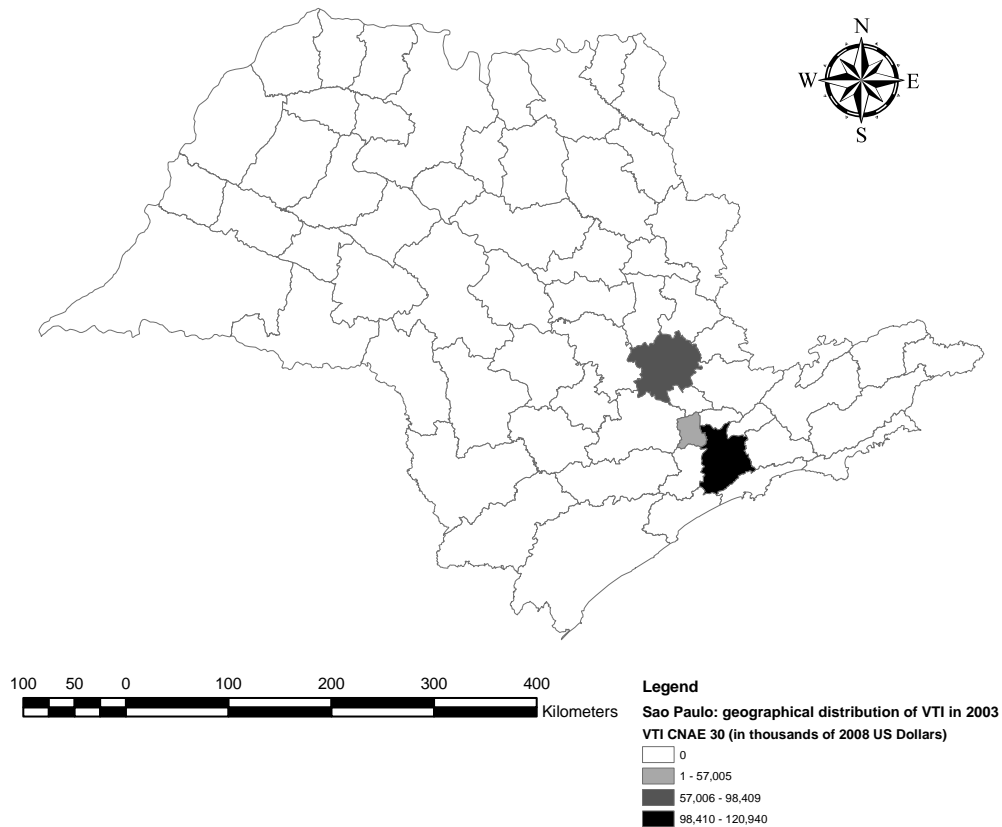
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c)**



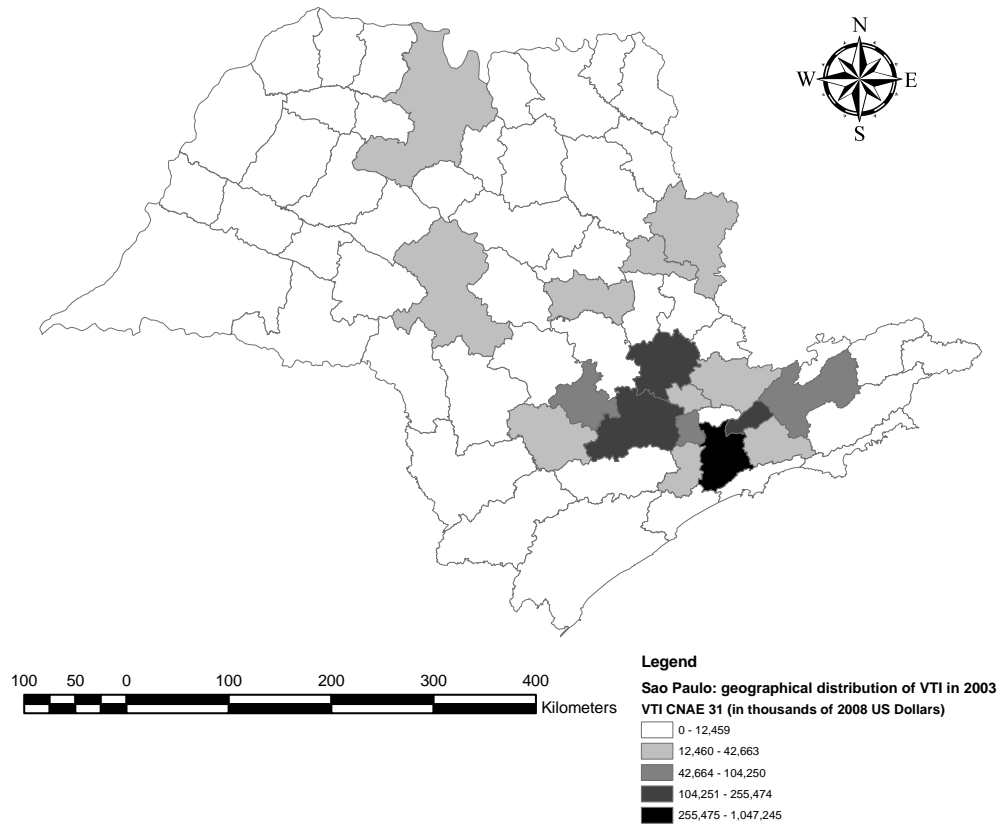
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting and computing machinery)**



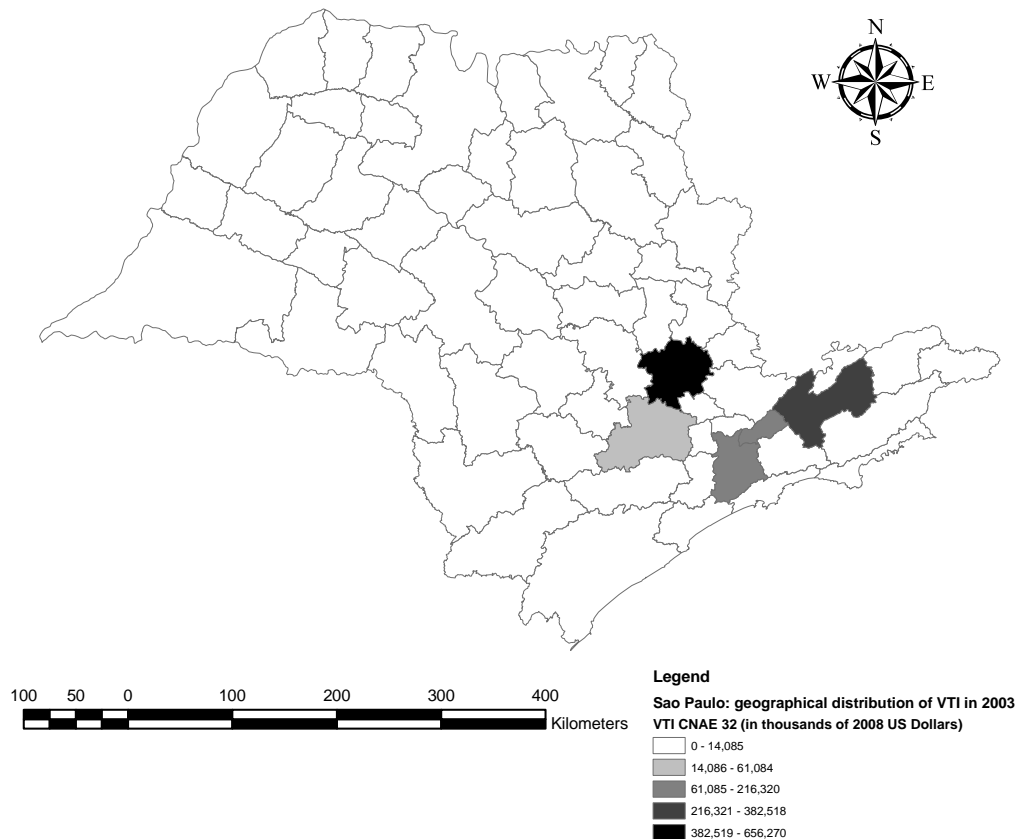
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
 Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
 Geographic Coordinated System: South American Datum 1969
 Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



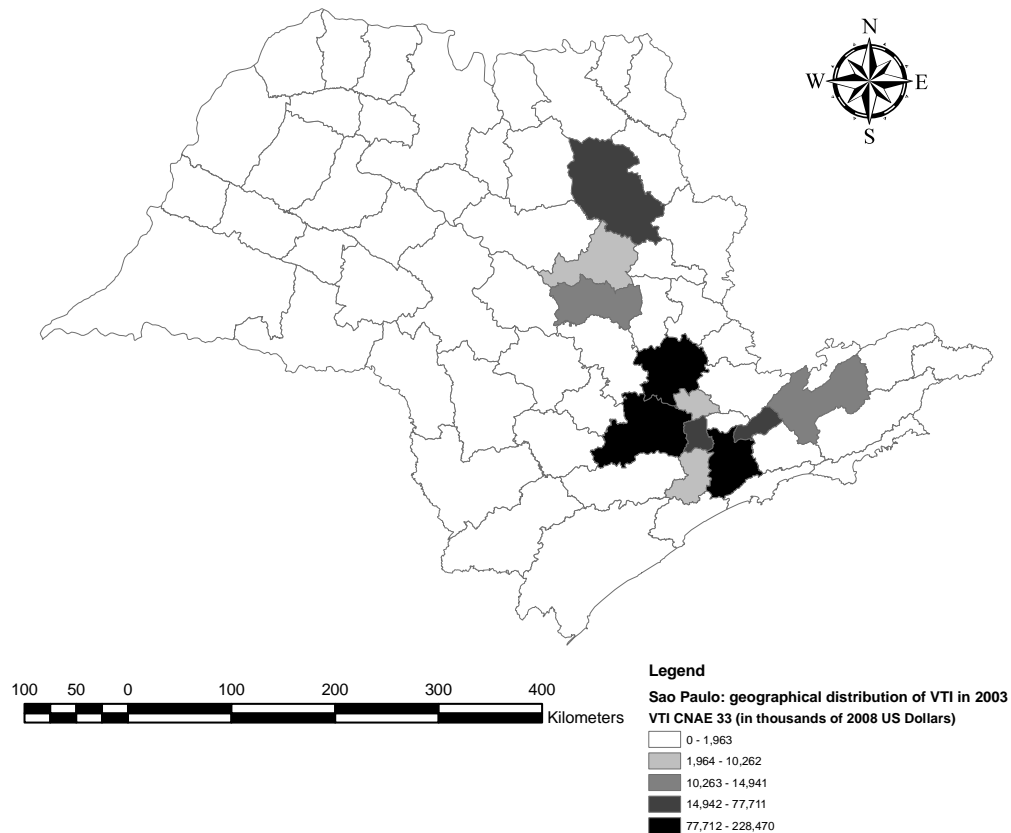
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and communication
equipment and apparatus)**



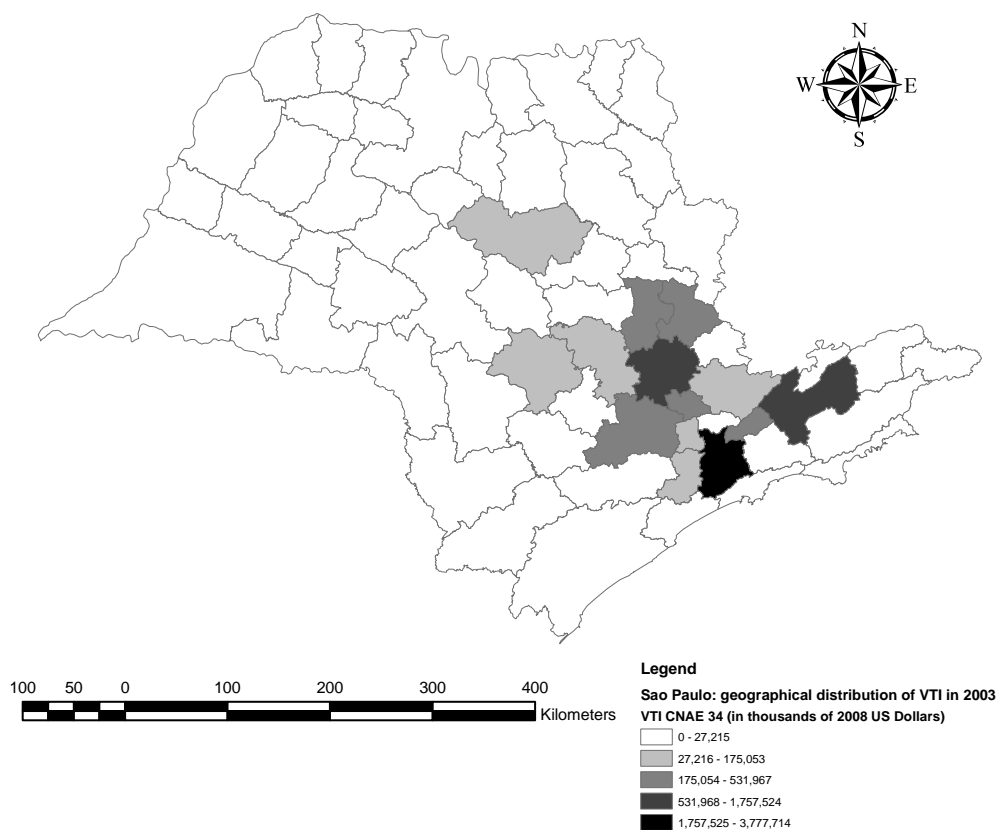
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision and optical
instruments, watches and clocks)**



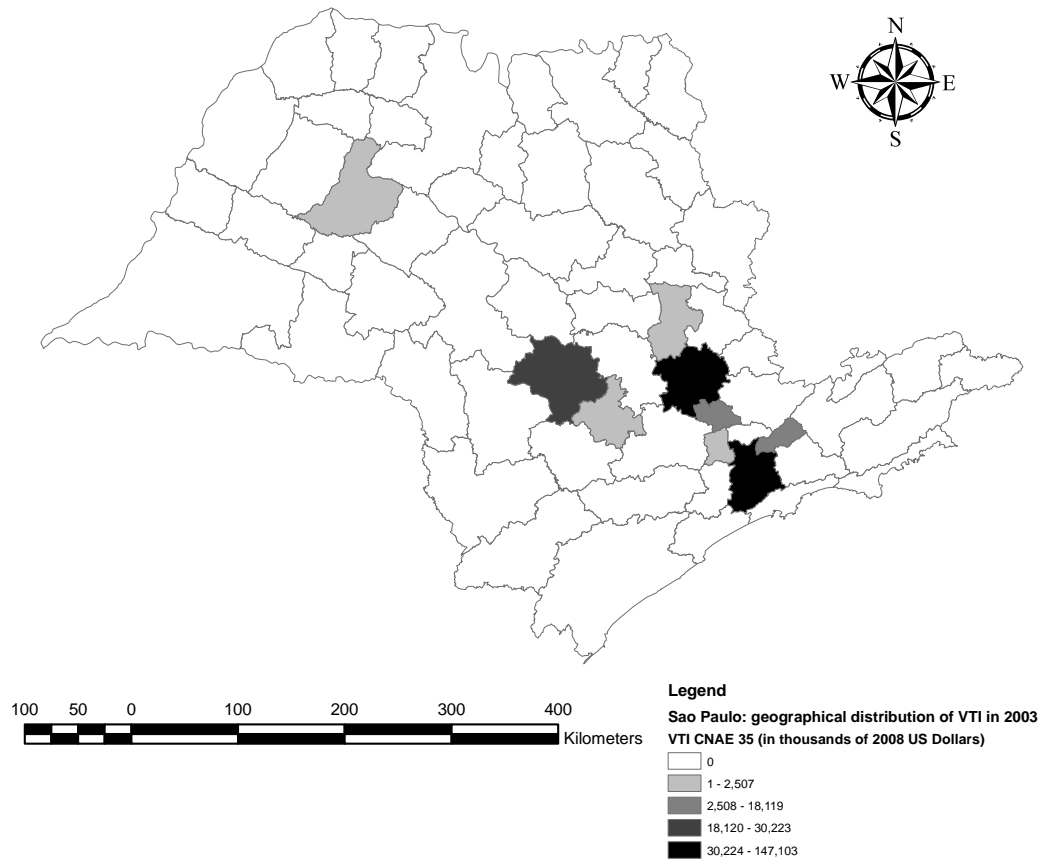
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



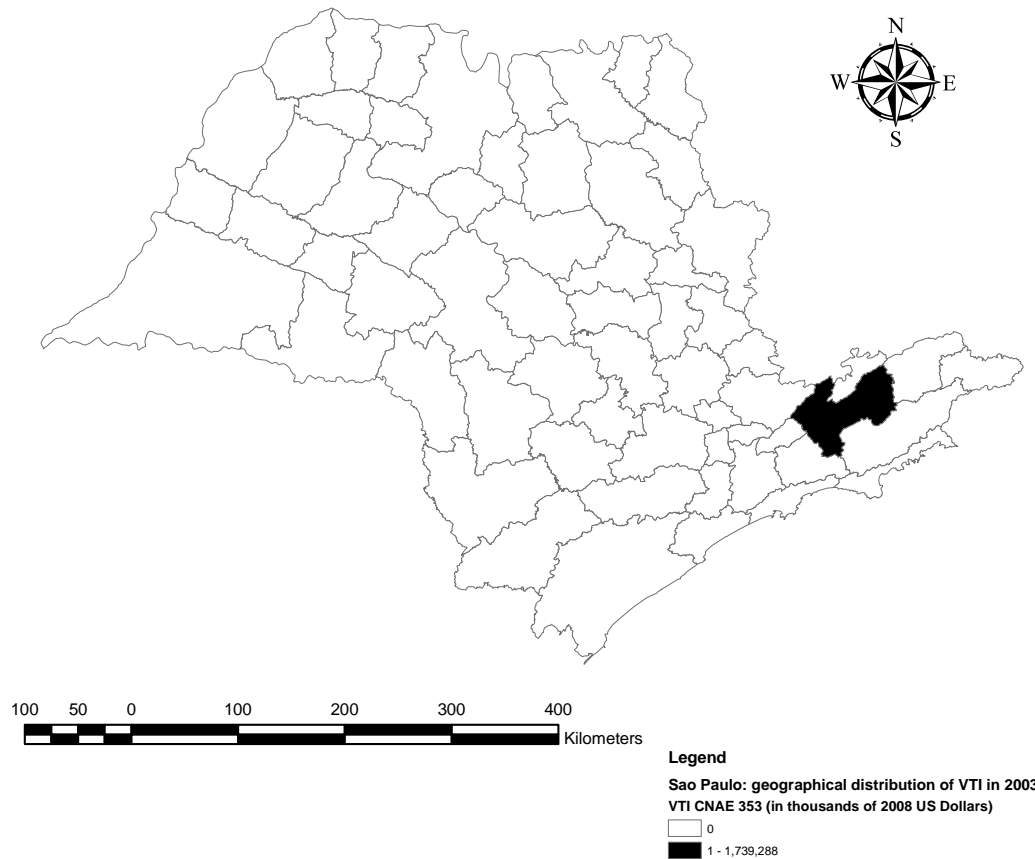
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

***Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)***



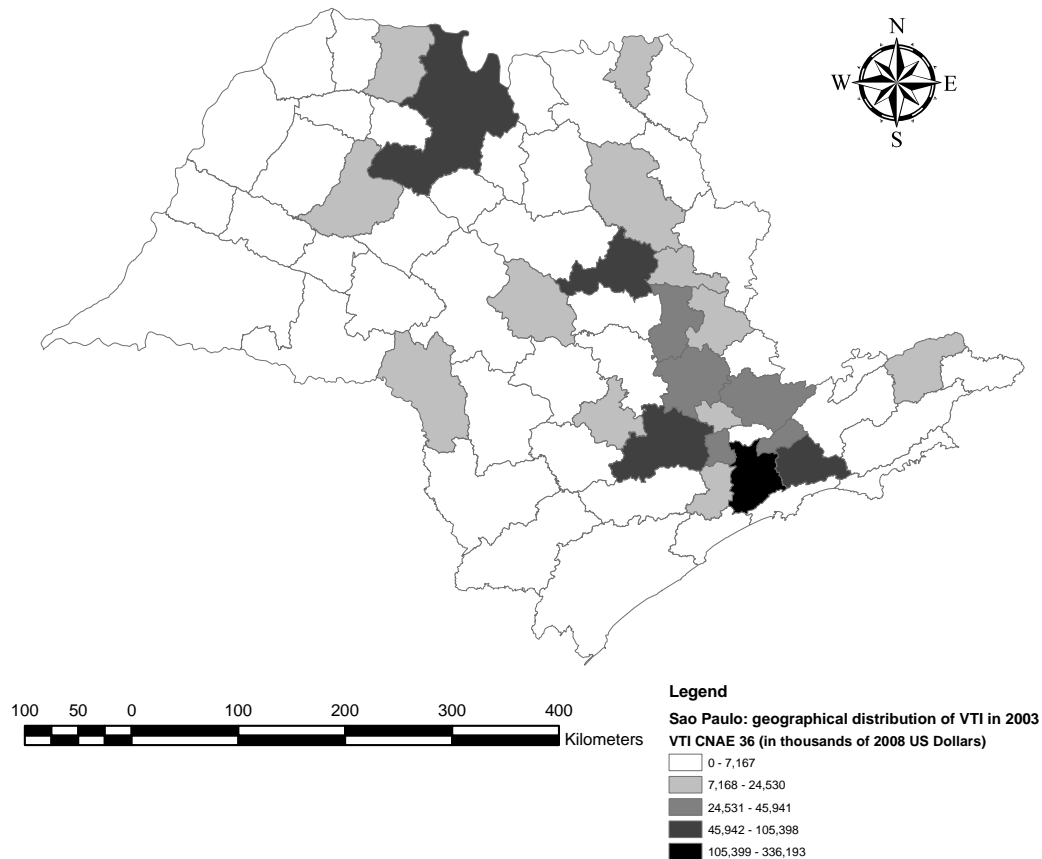
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



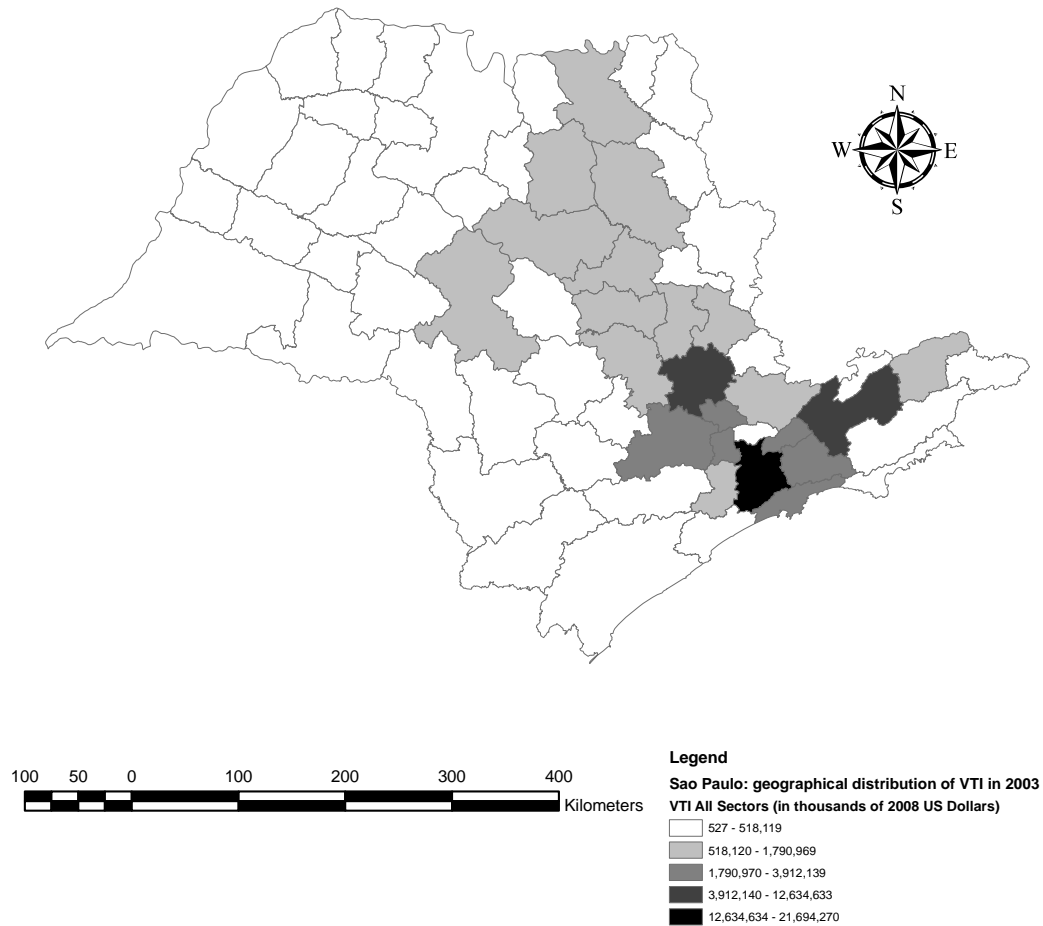
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



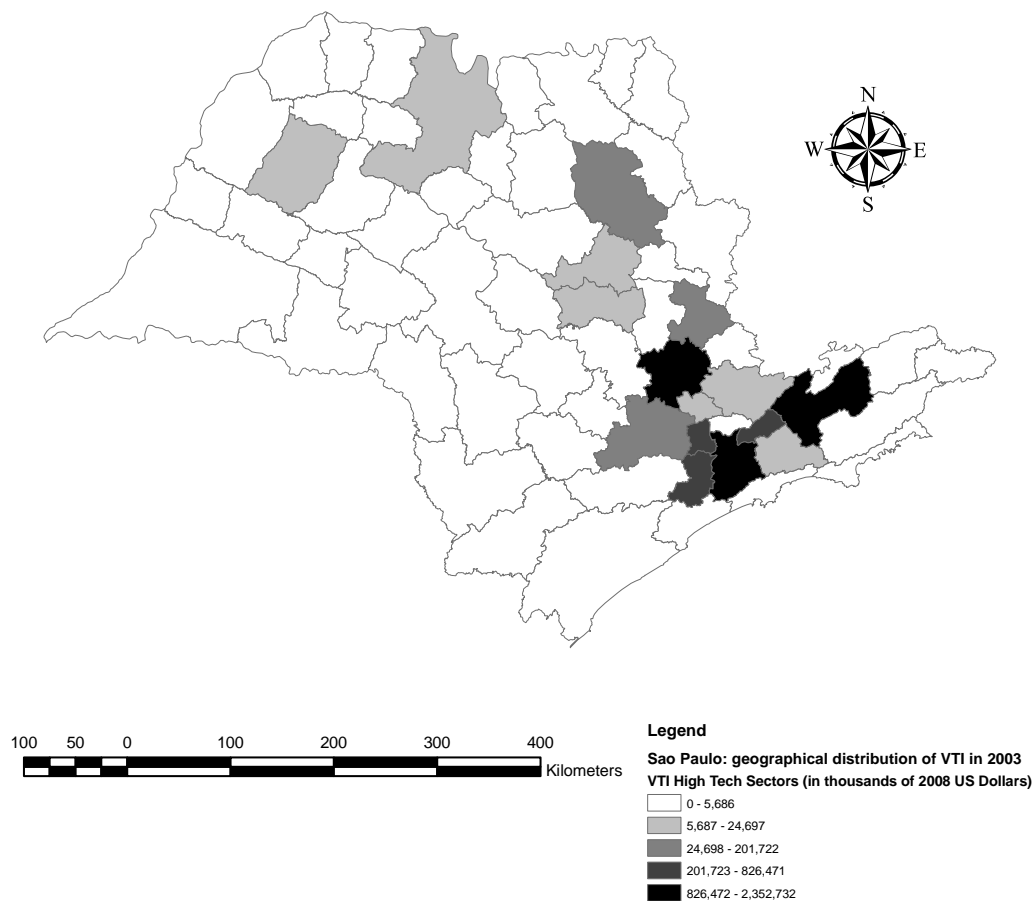
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
All Manufacturing Sectors**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

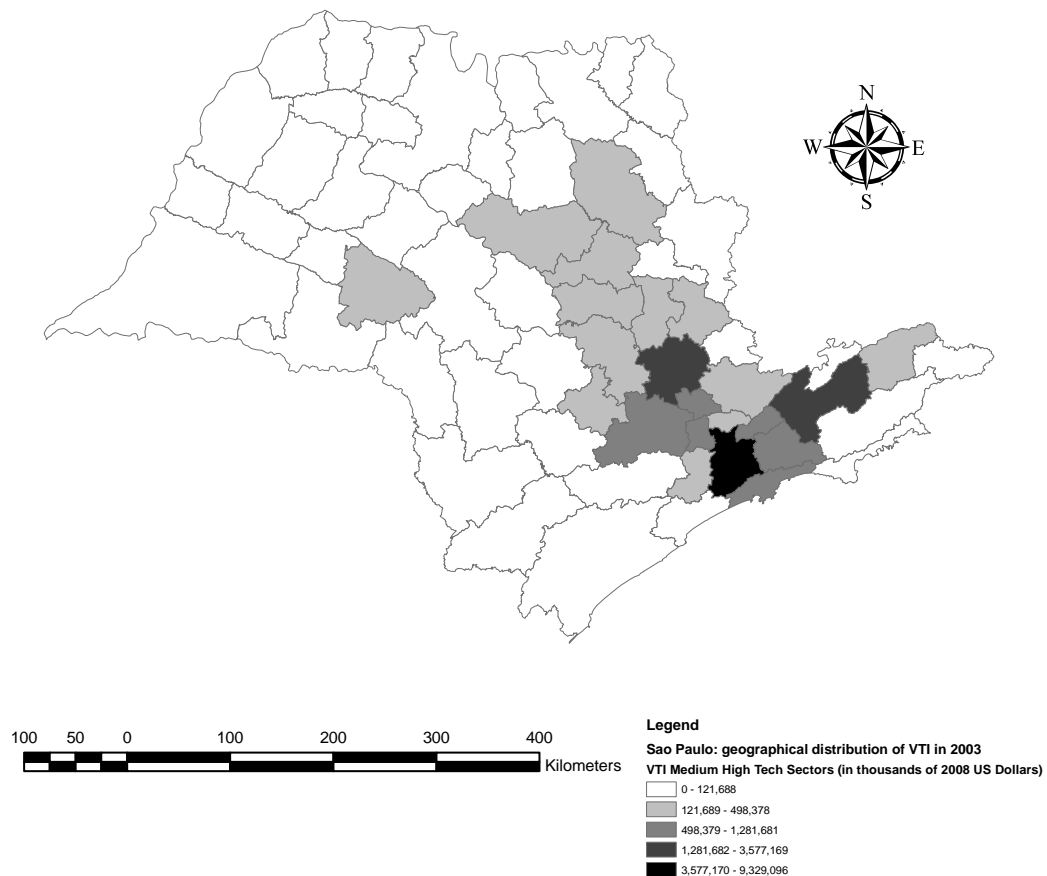
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
High Tech Sectors (1)**



(1) High Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

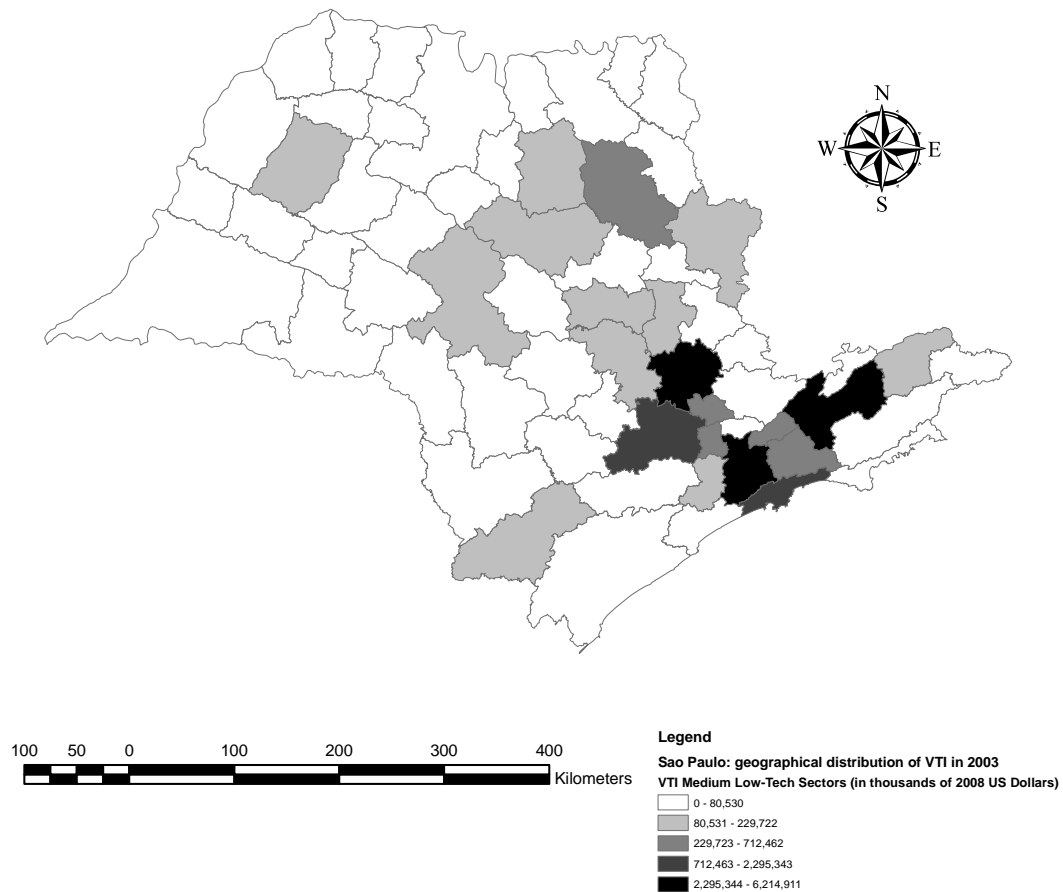
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
Medium High-Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

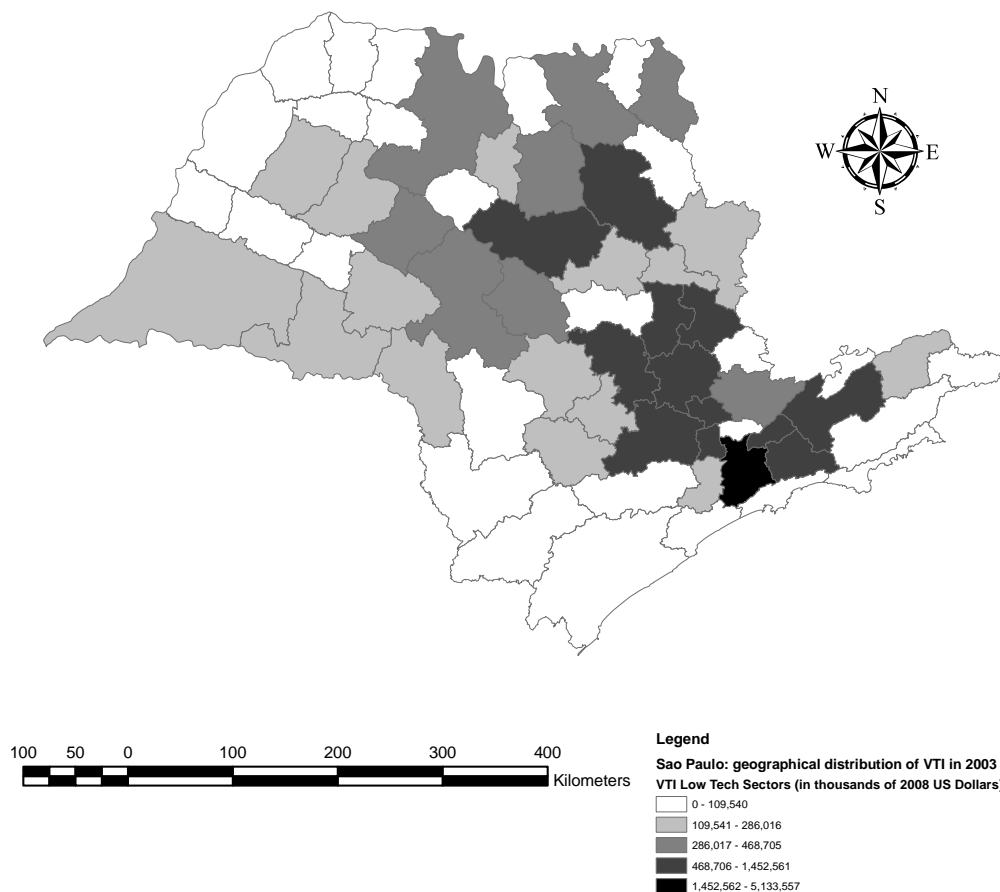
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2003
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products;Coke, refined petroleum products and nuclear fuel;
Other non-metallic and mineral products;Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2003 Low-Tech Sectors (1)



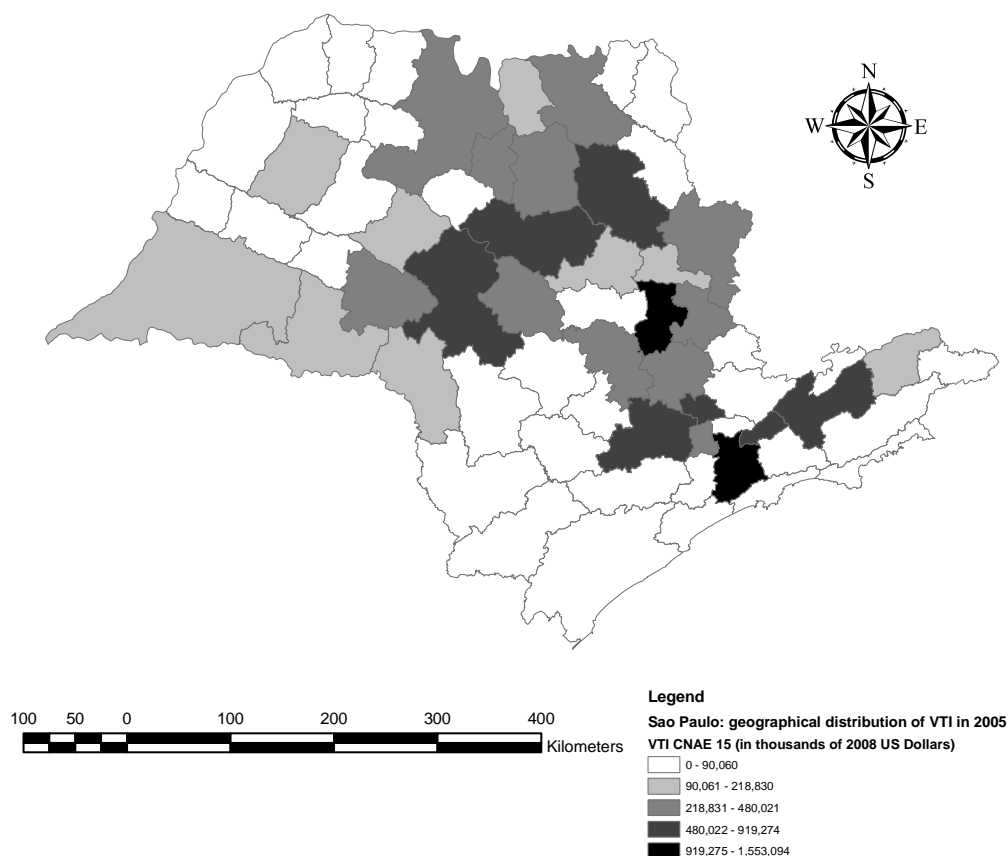
(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)

Geographic Coordinated System: South American Datum 1969

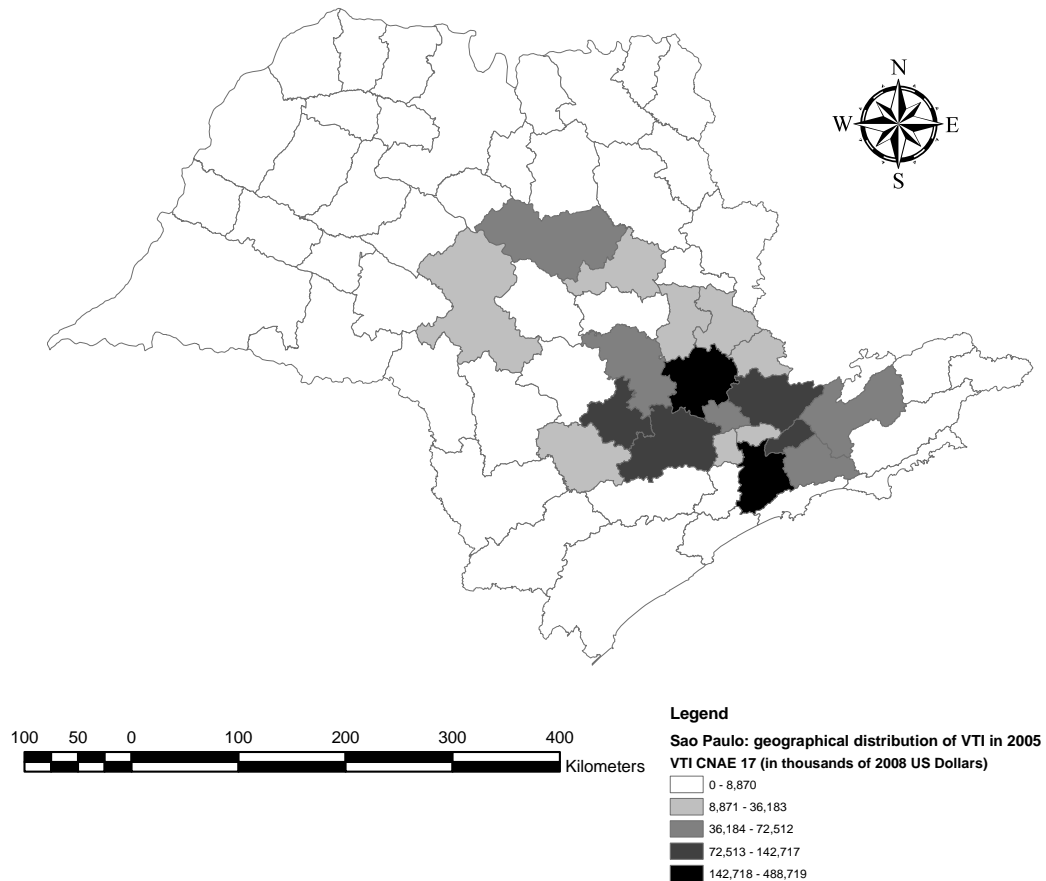
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



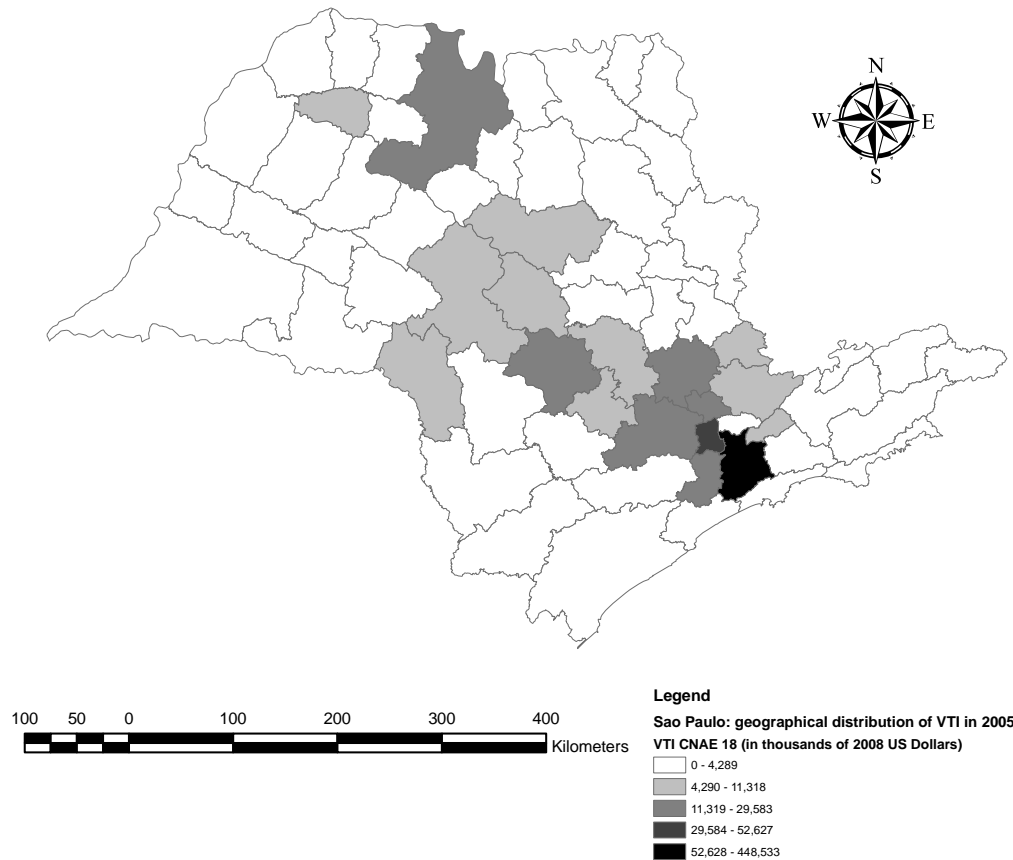
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



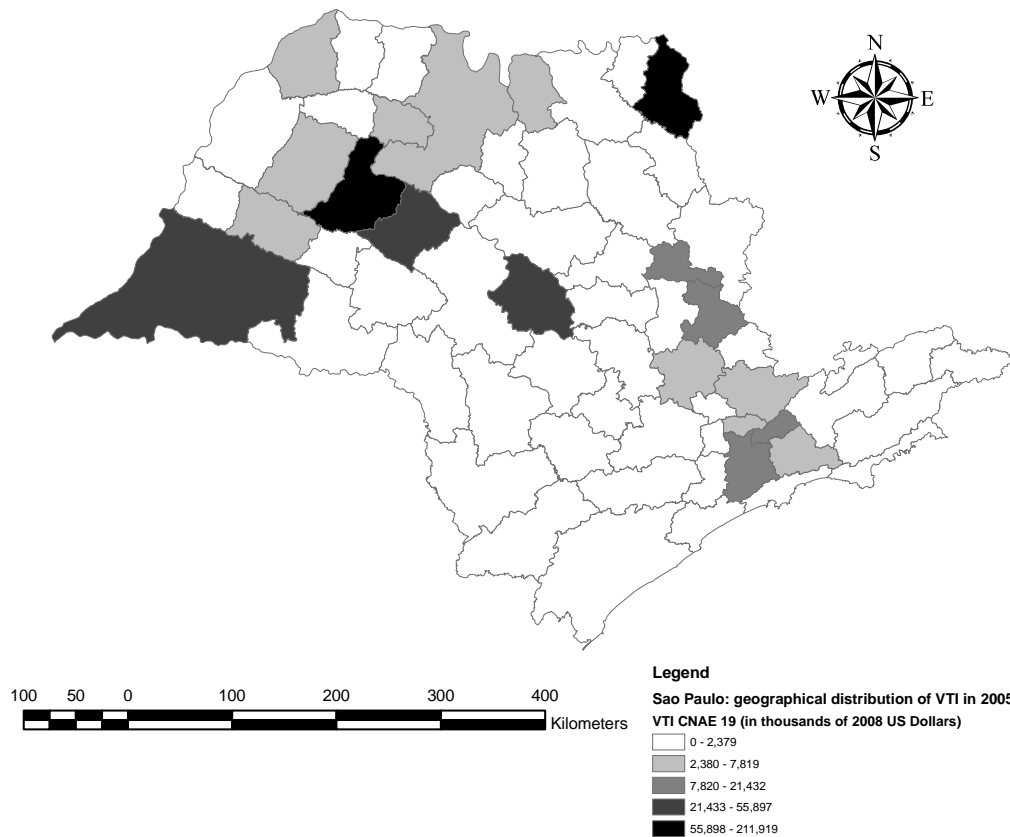
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel; dressing and dyeing of fur)**



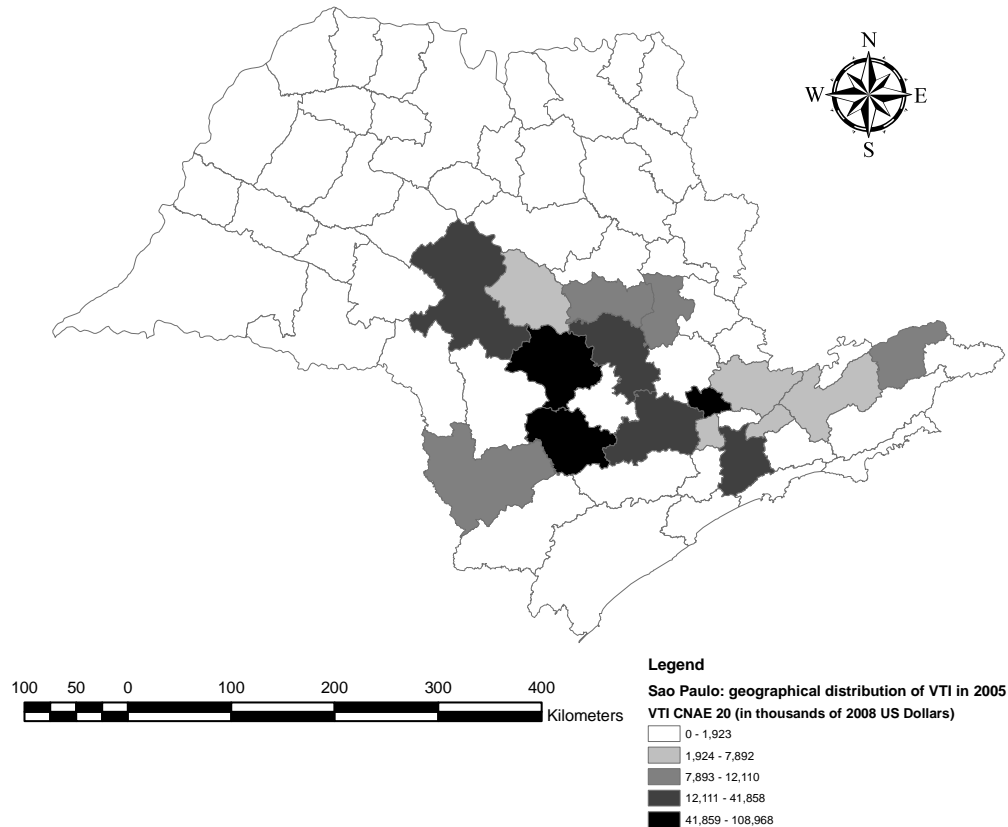
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather;
manufacture of luggage, handbags, saddlery,
harness and footwear)**



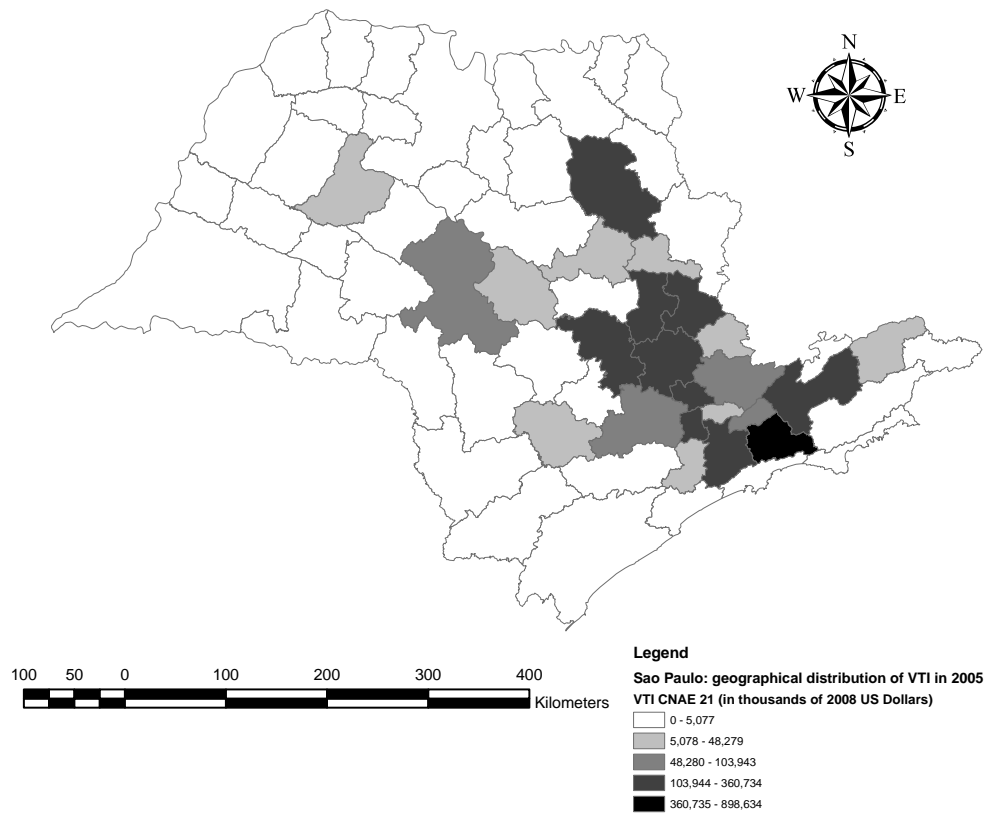
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products of wood
and cork, except furniture; manufacture of
articles of straw and plaiting materials)**



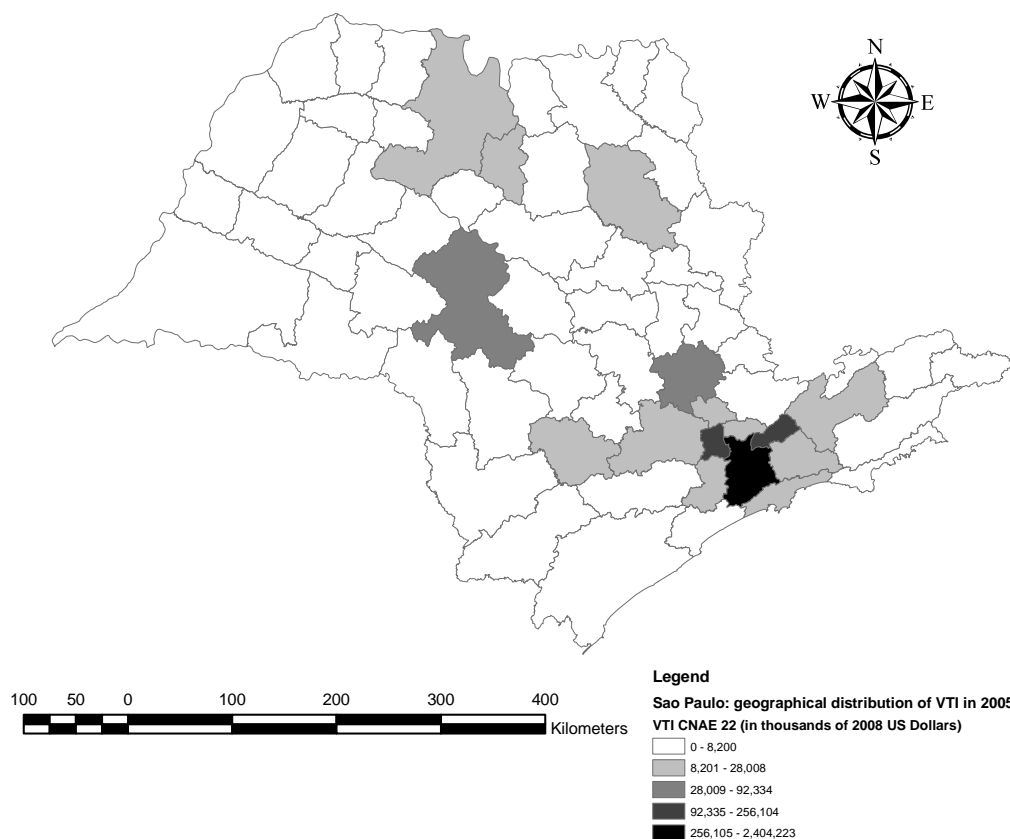
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



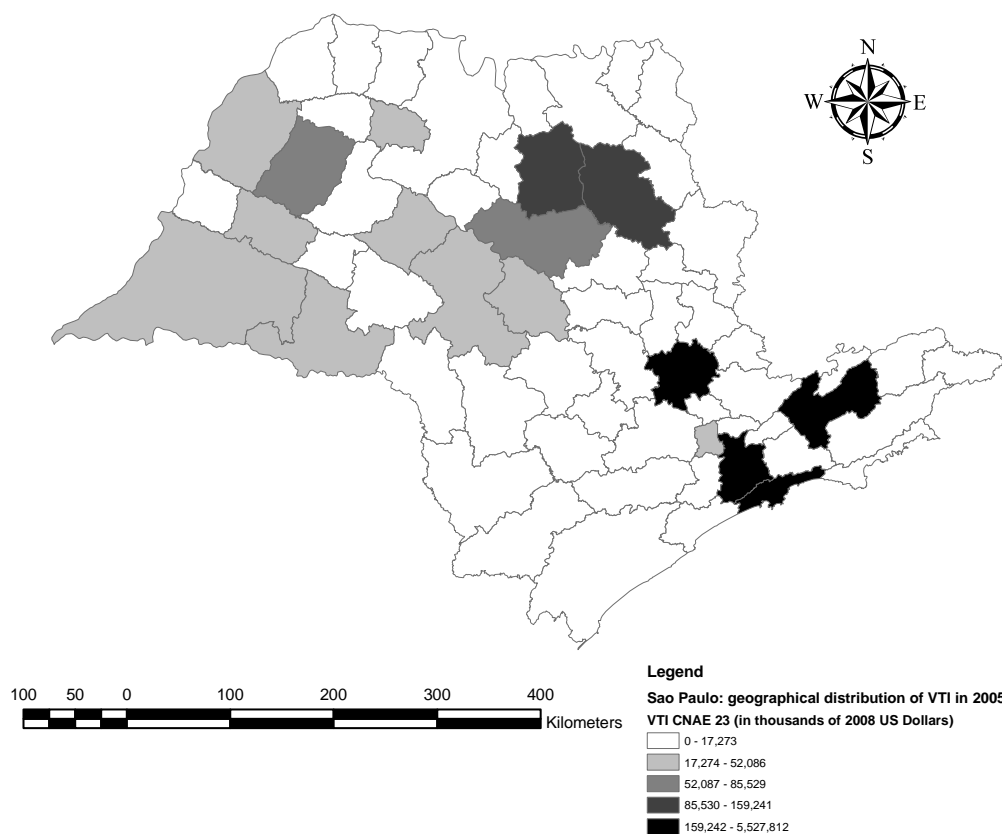
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



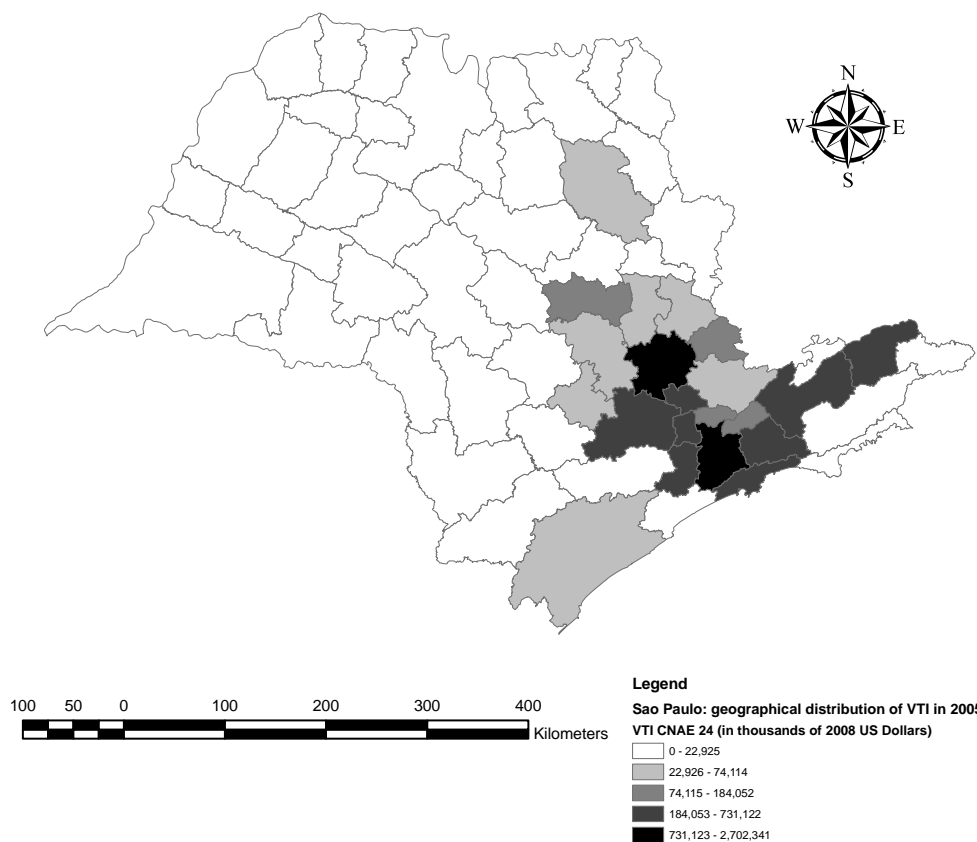
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum products
and nuclear fuel)**



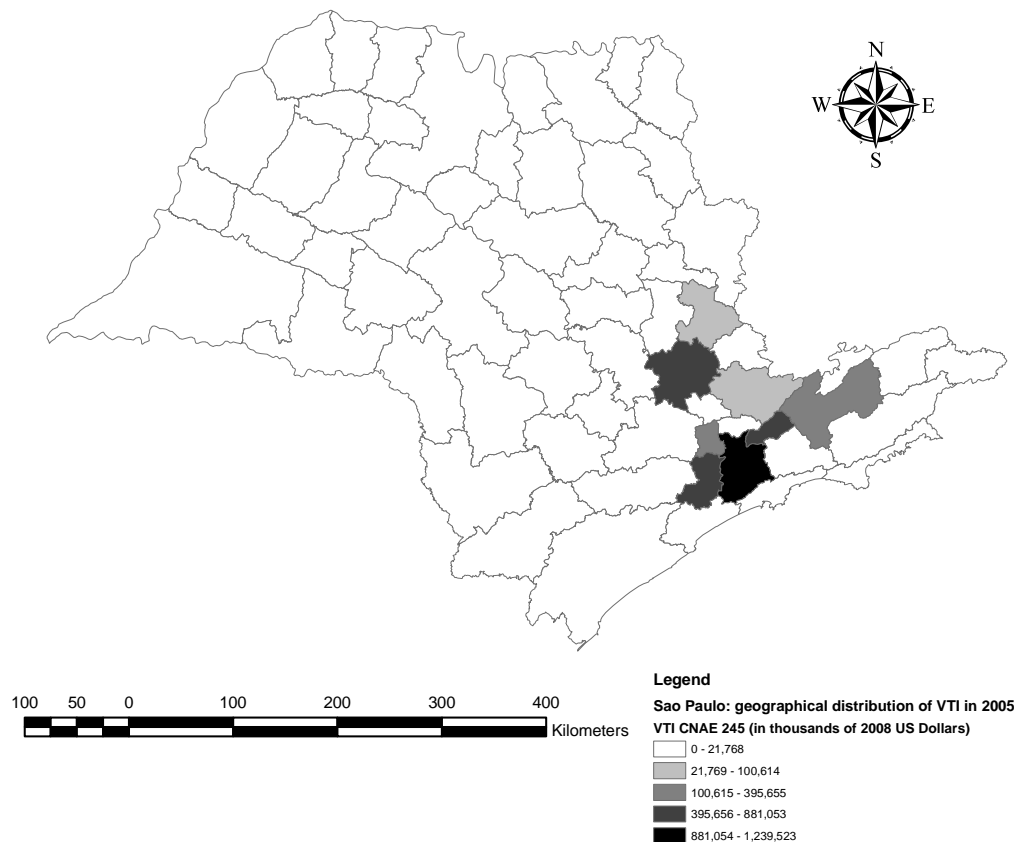
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Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 24, exc. CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



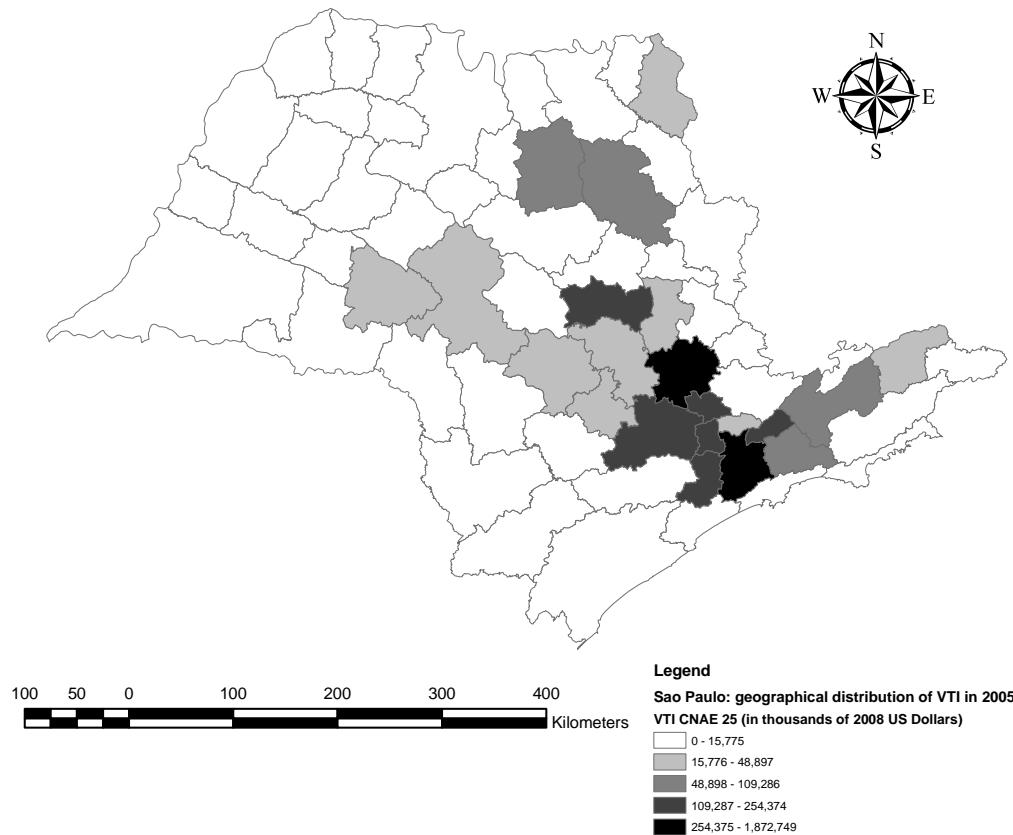
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals, medicinal
chemicals and botanical products)**



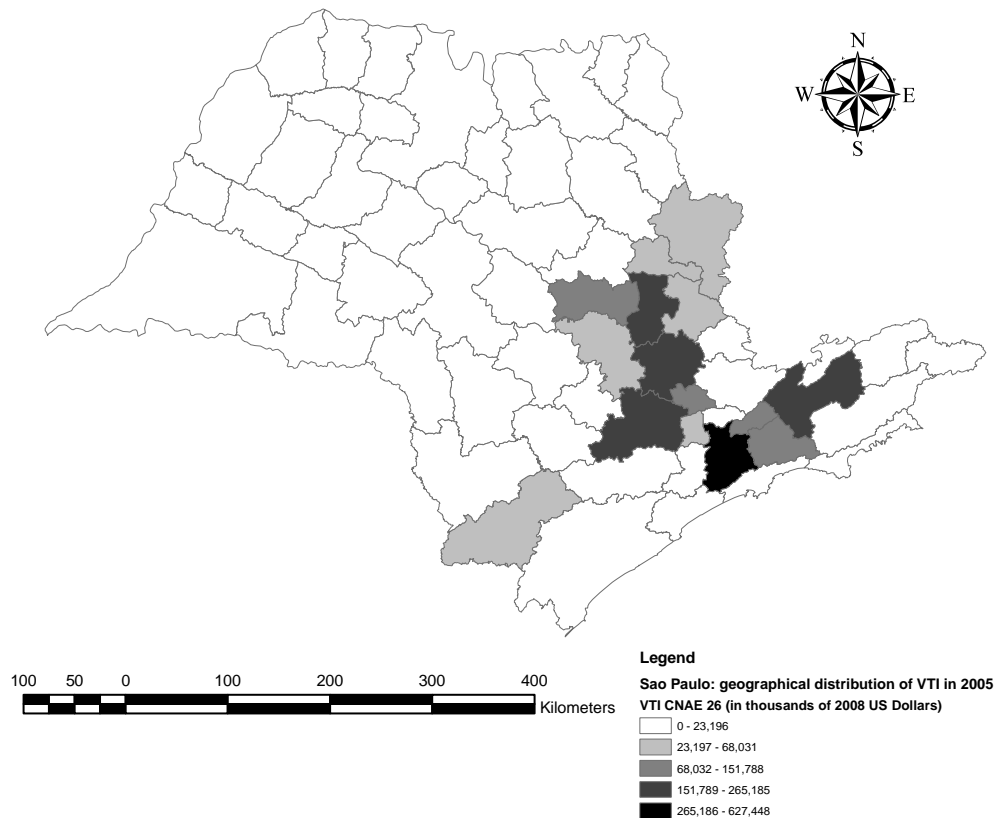
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**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



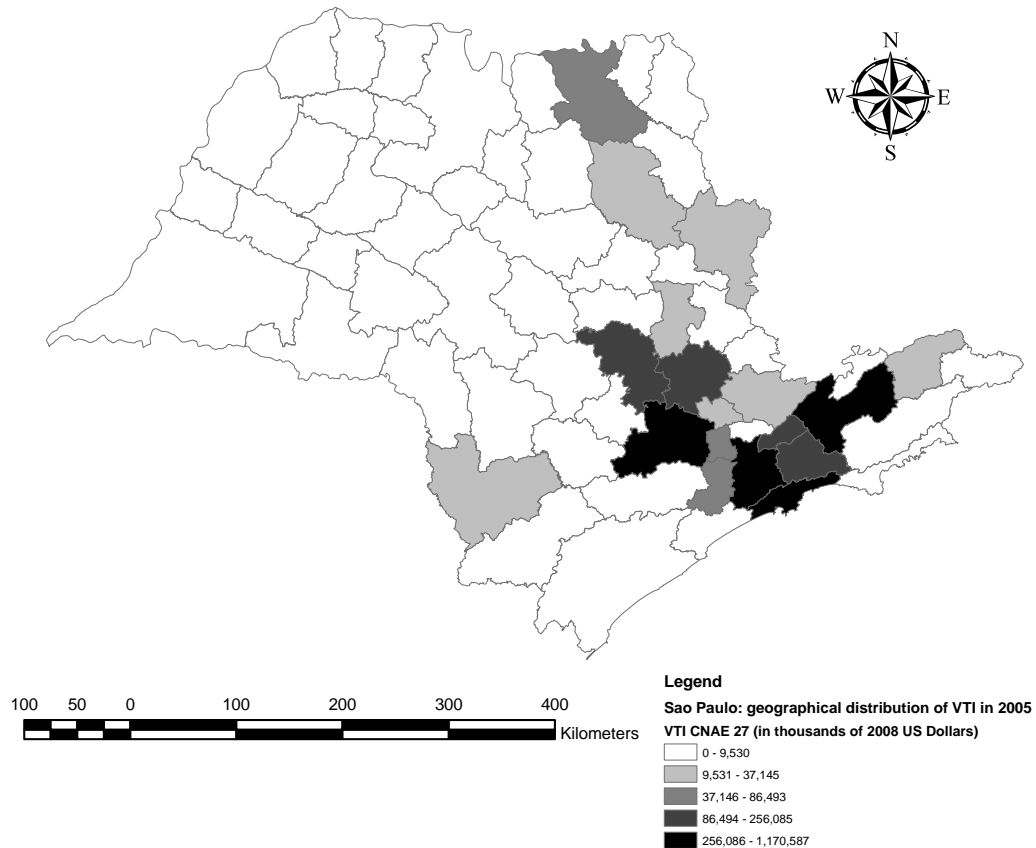
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Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



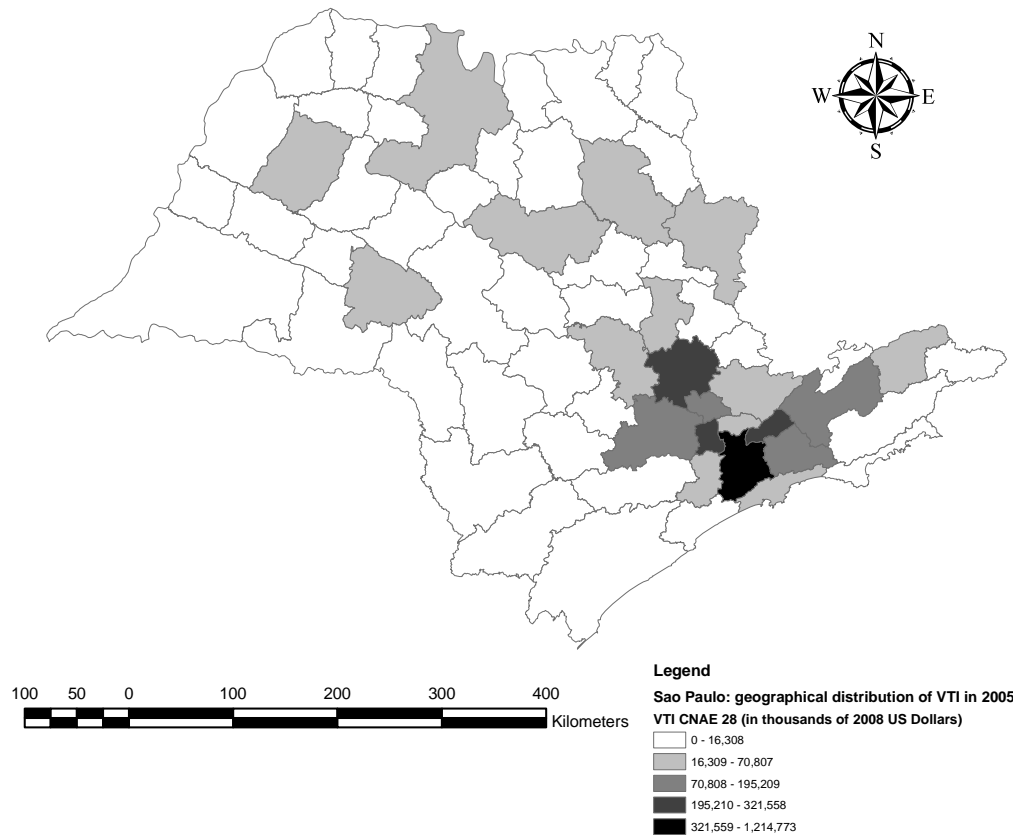
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



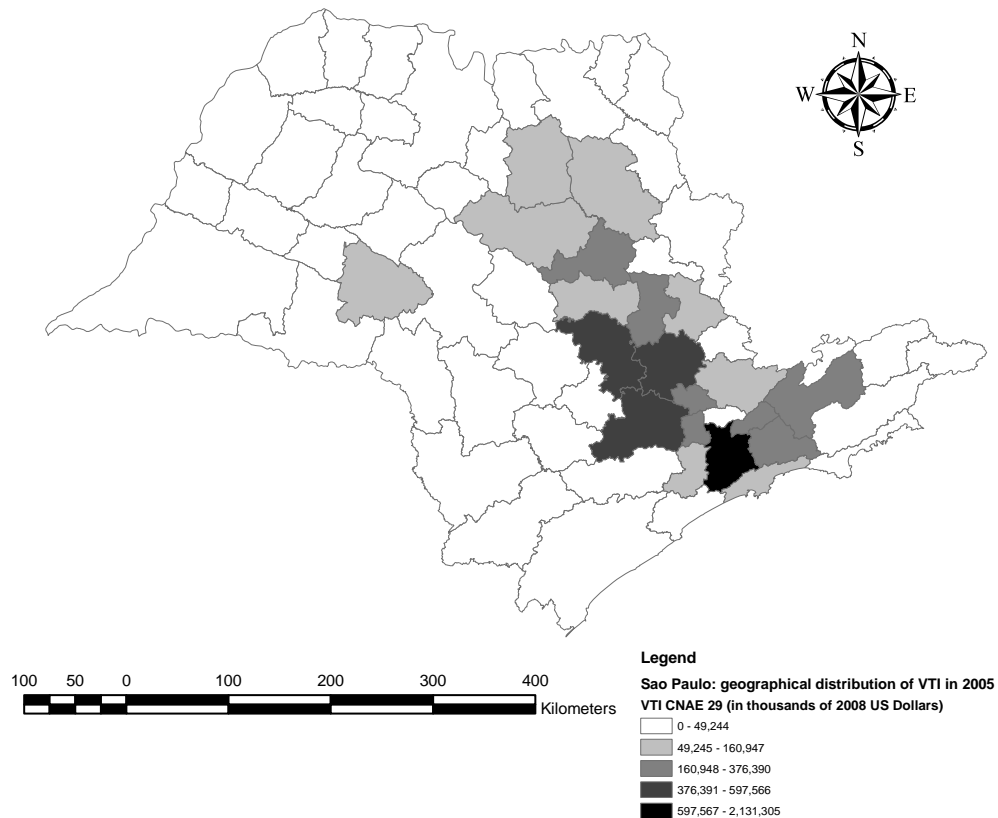
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
 Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal)
 Geographic Coordinated System: South American Datum 1969
 Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



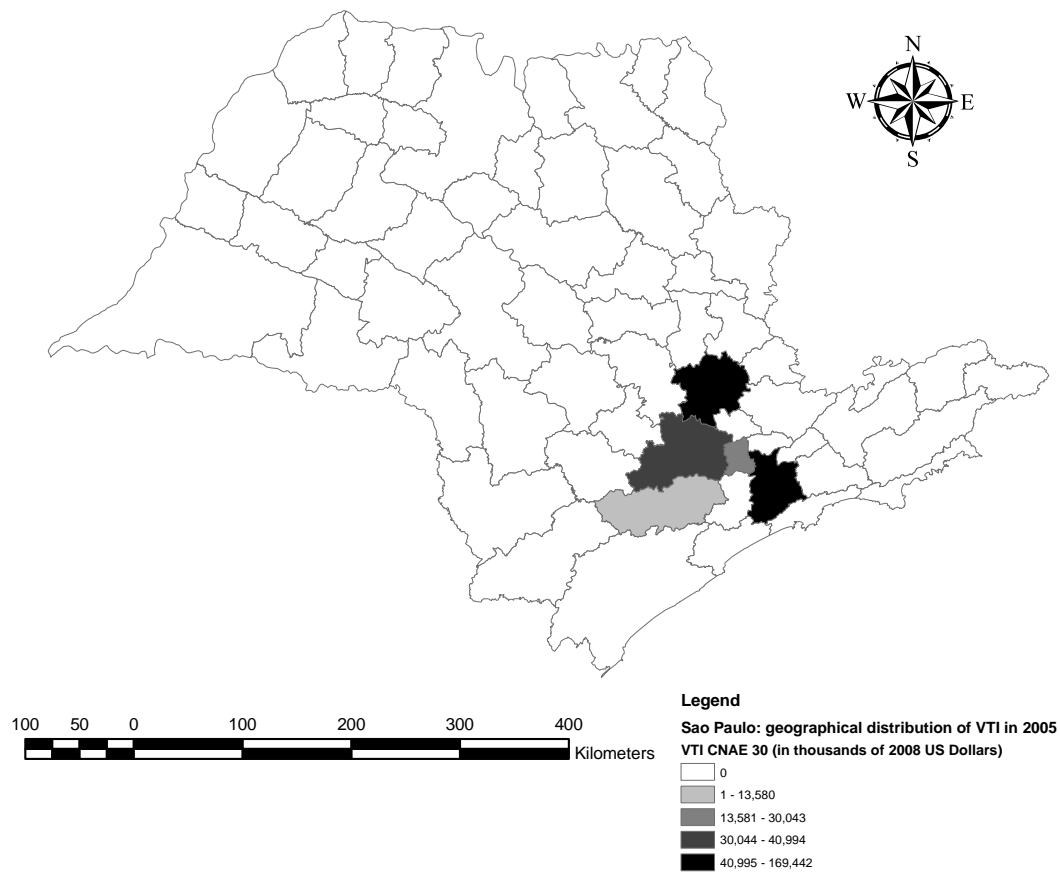
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



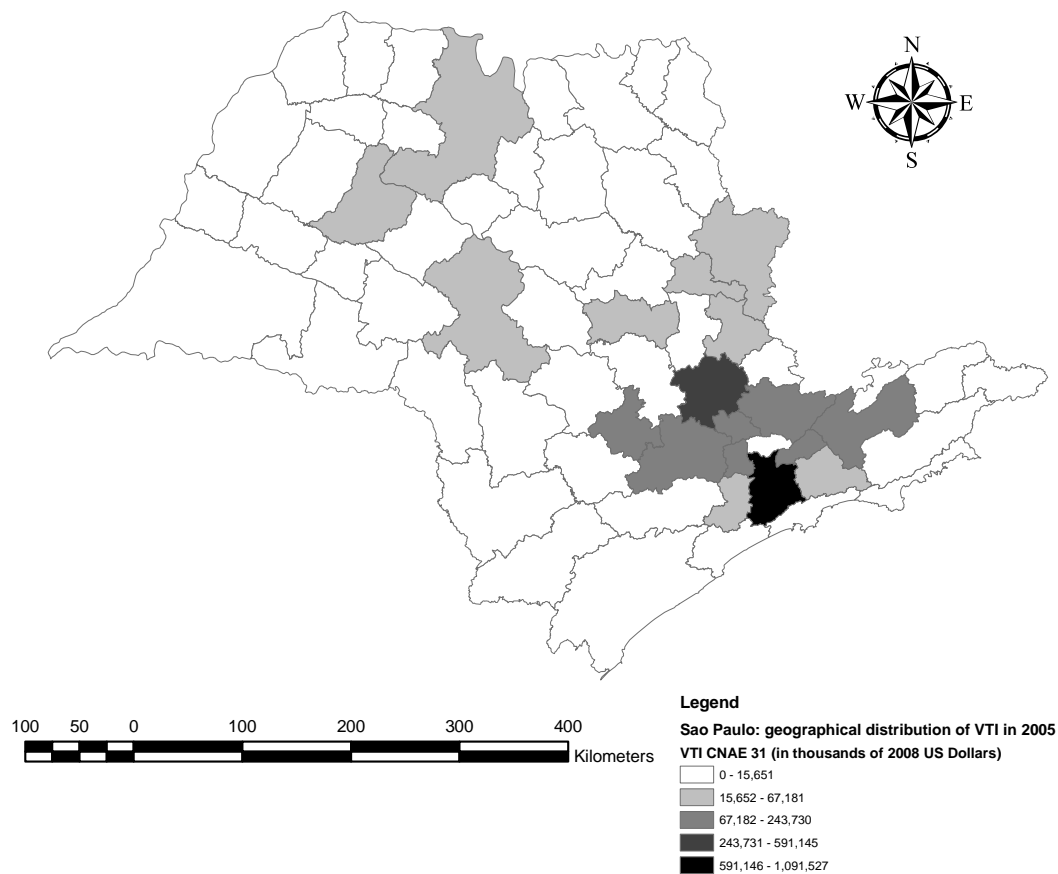
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting and computing machinery)**



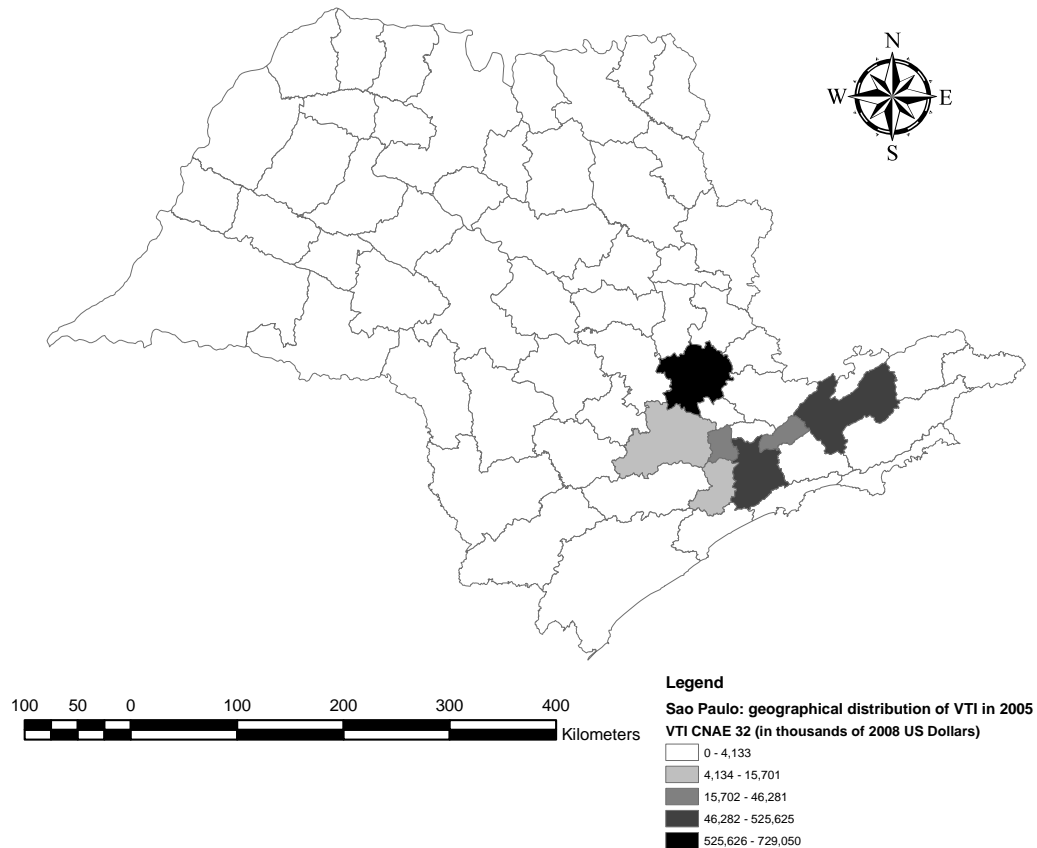
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



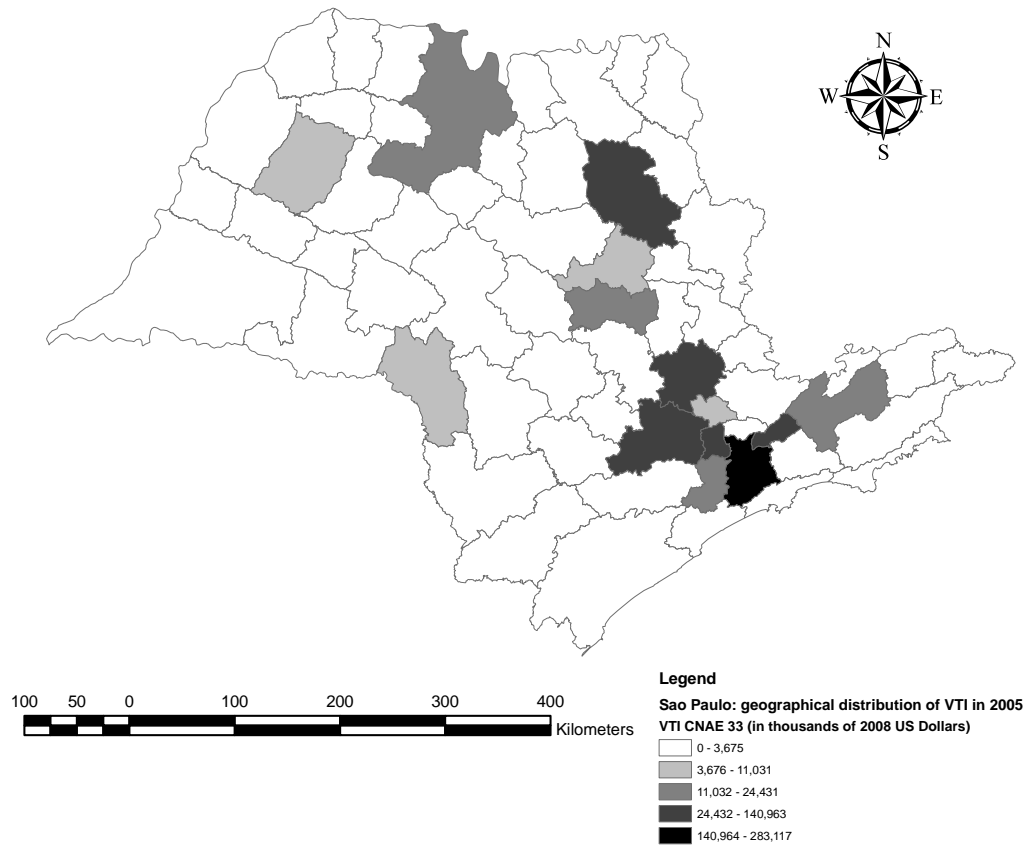
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and communication
equipment and apparatus)**



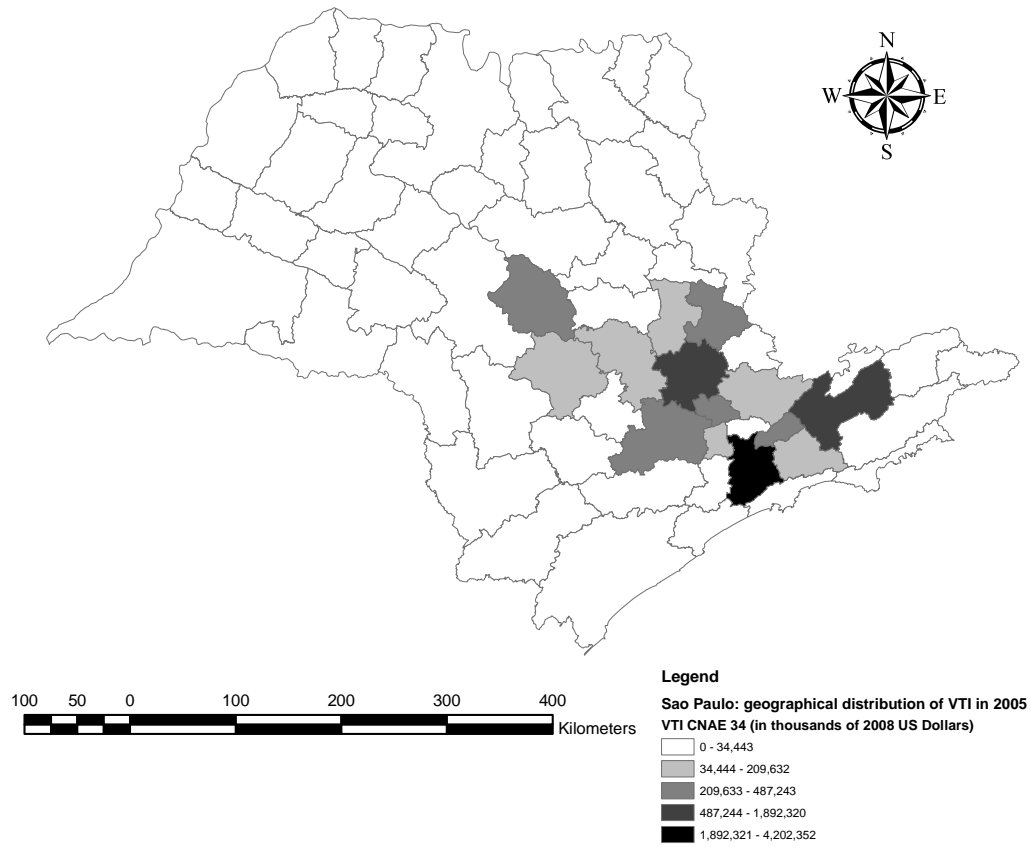
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision and optical
instruments, watches and clocks)**



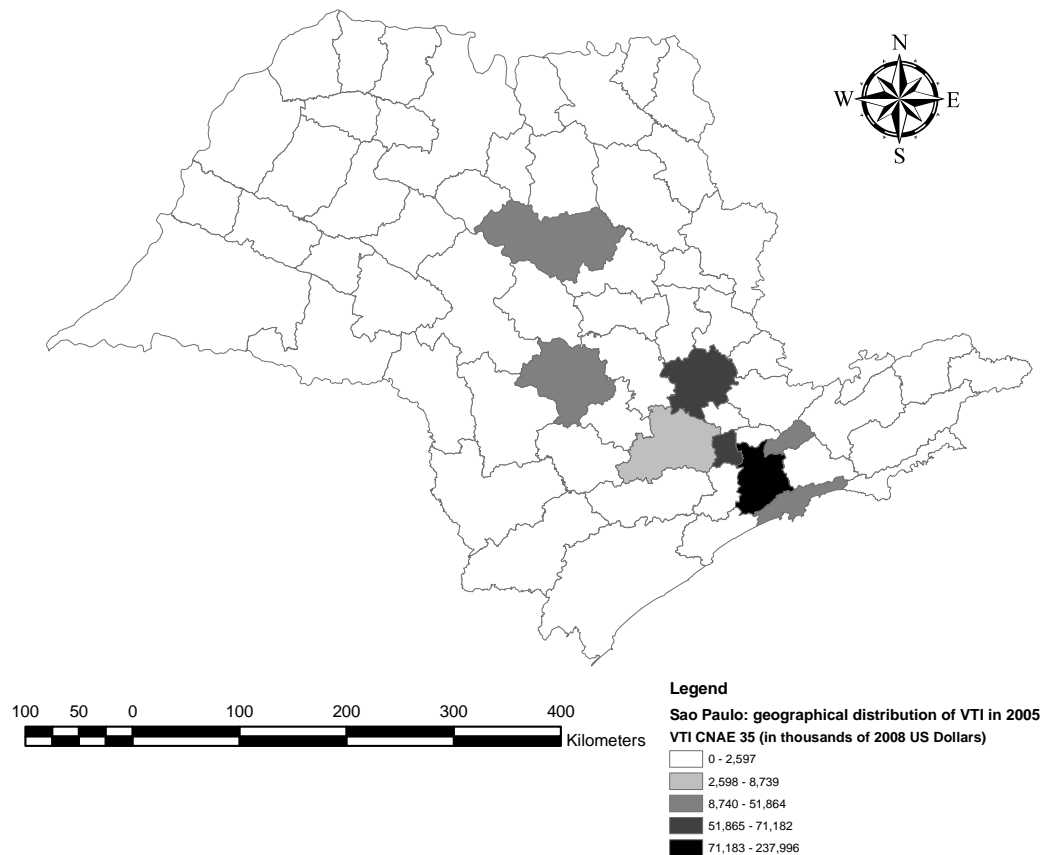
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



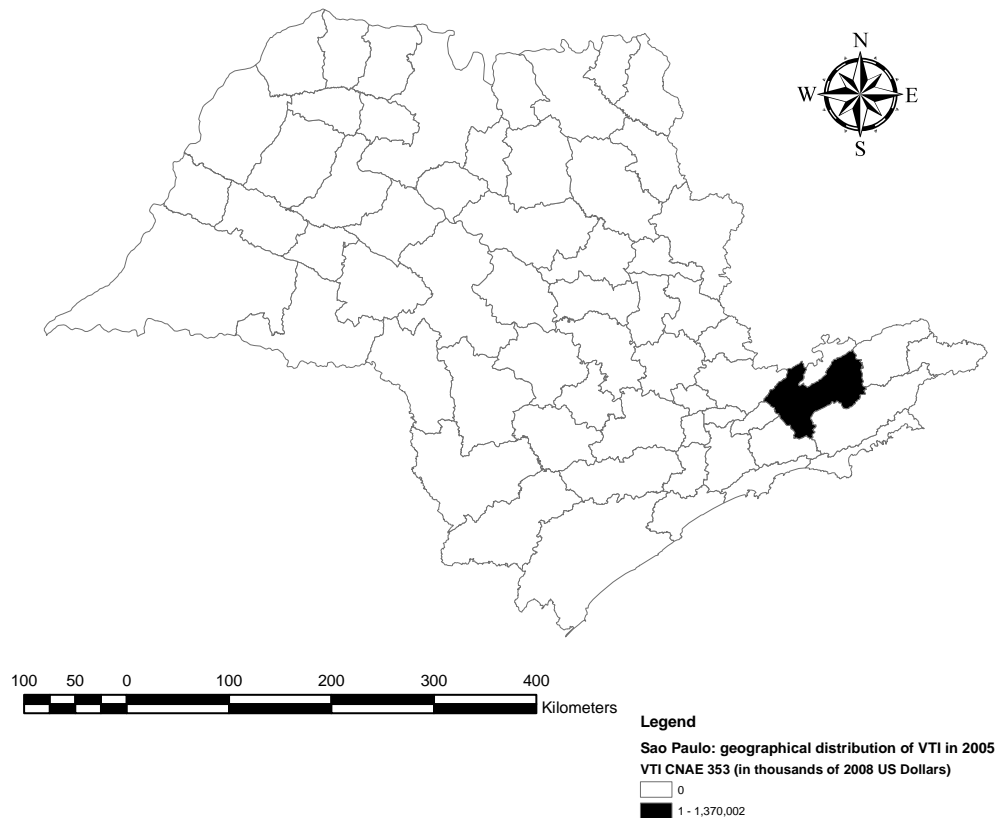
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



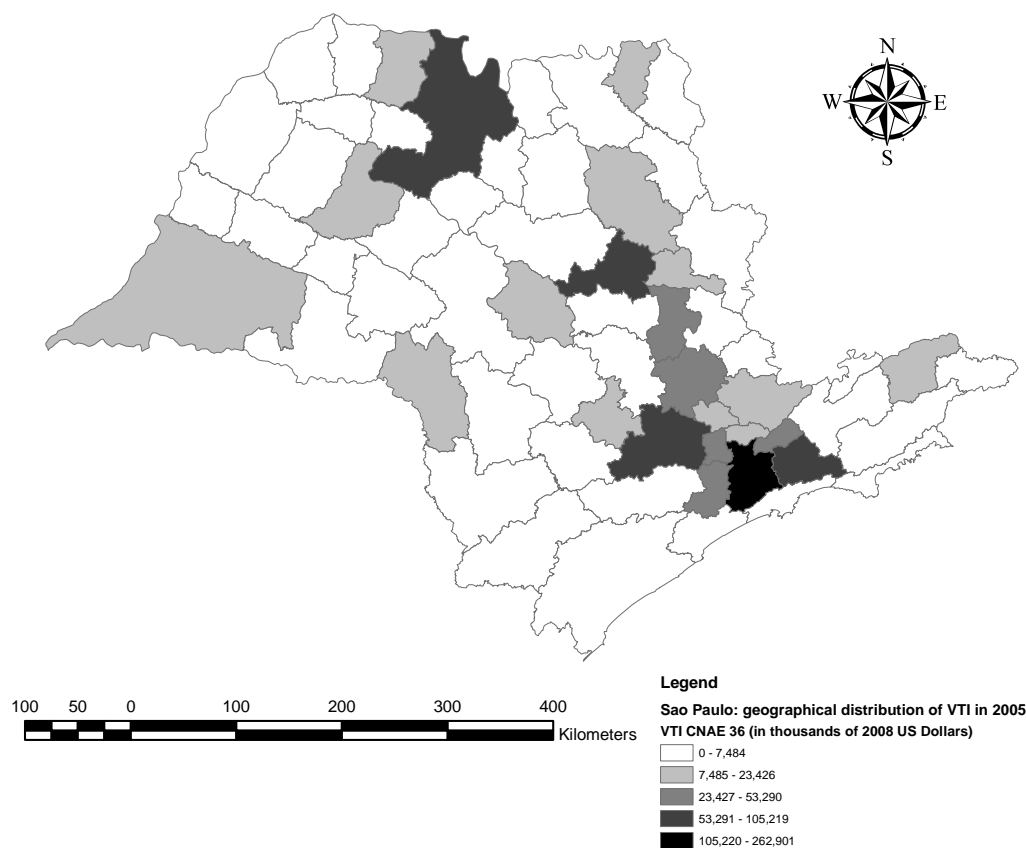
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



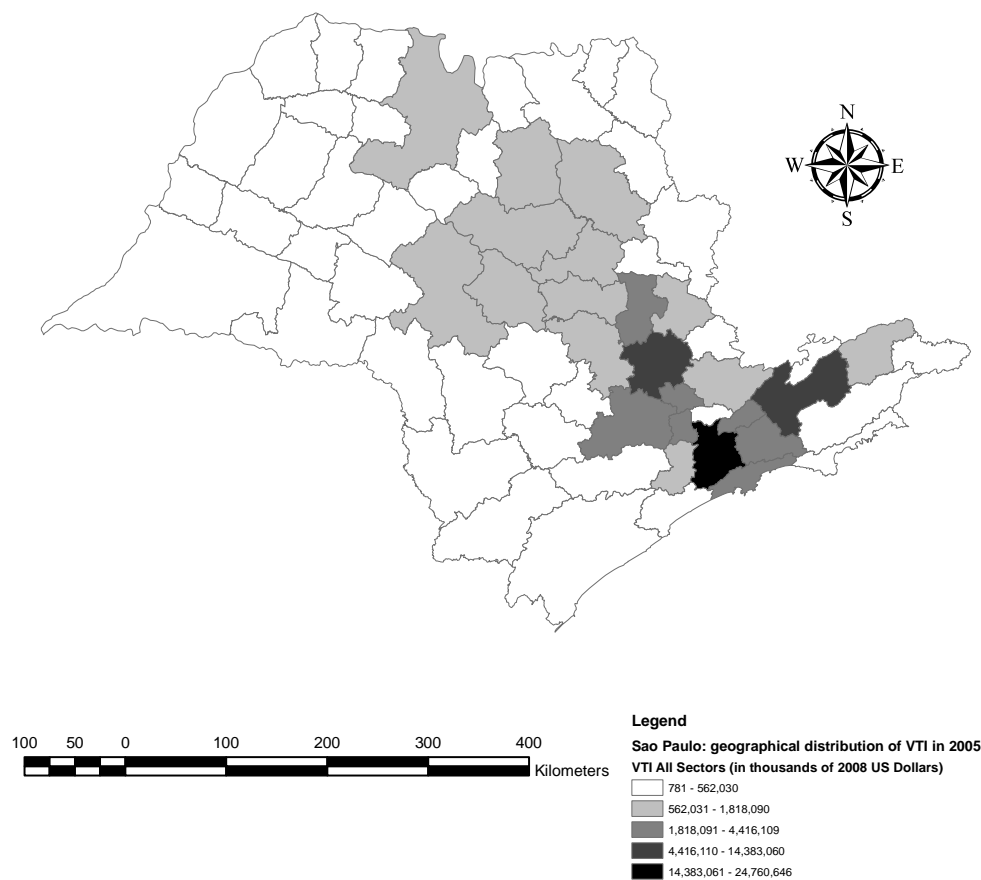
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



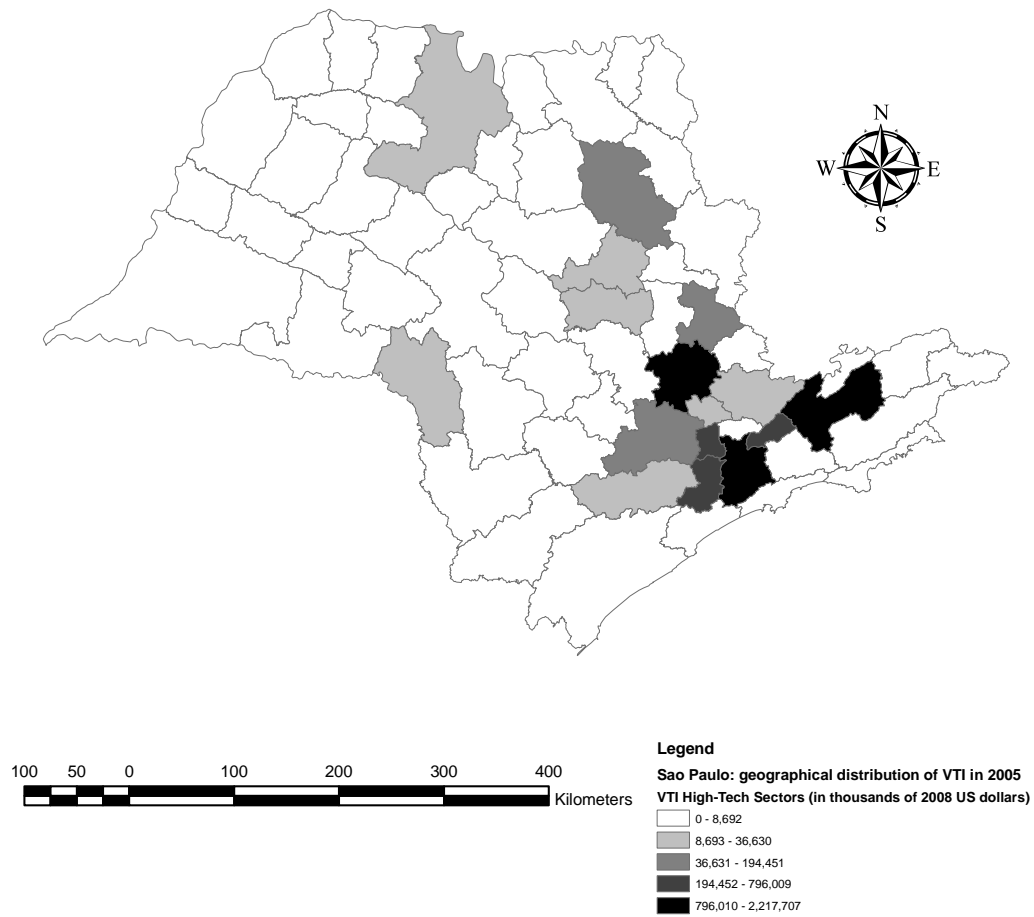
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
All Manufacturing Sectors**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2005 High-Tech Sectors (1)



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

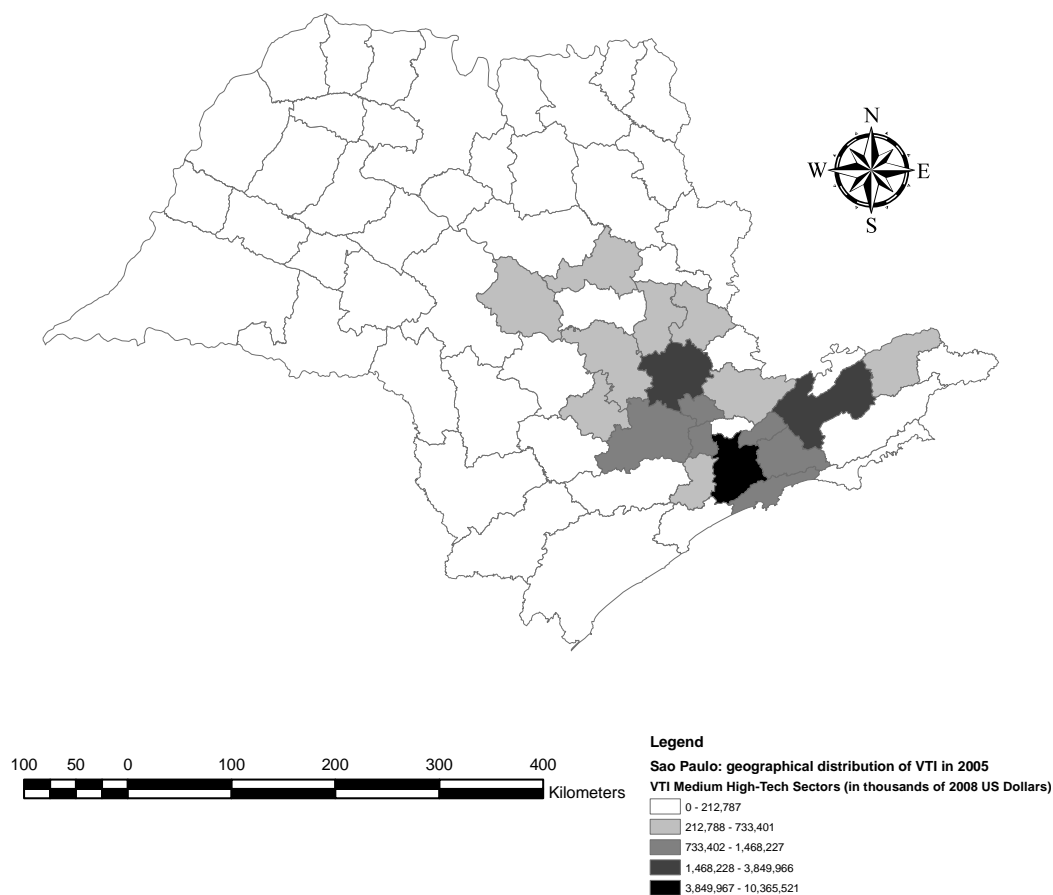
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).

Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)

Geographic Coordinated System: South American Datum 1969

Projected Coordinated System: UTM South American Zone 22S

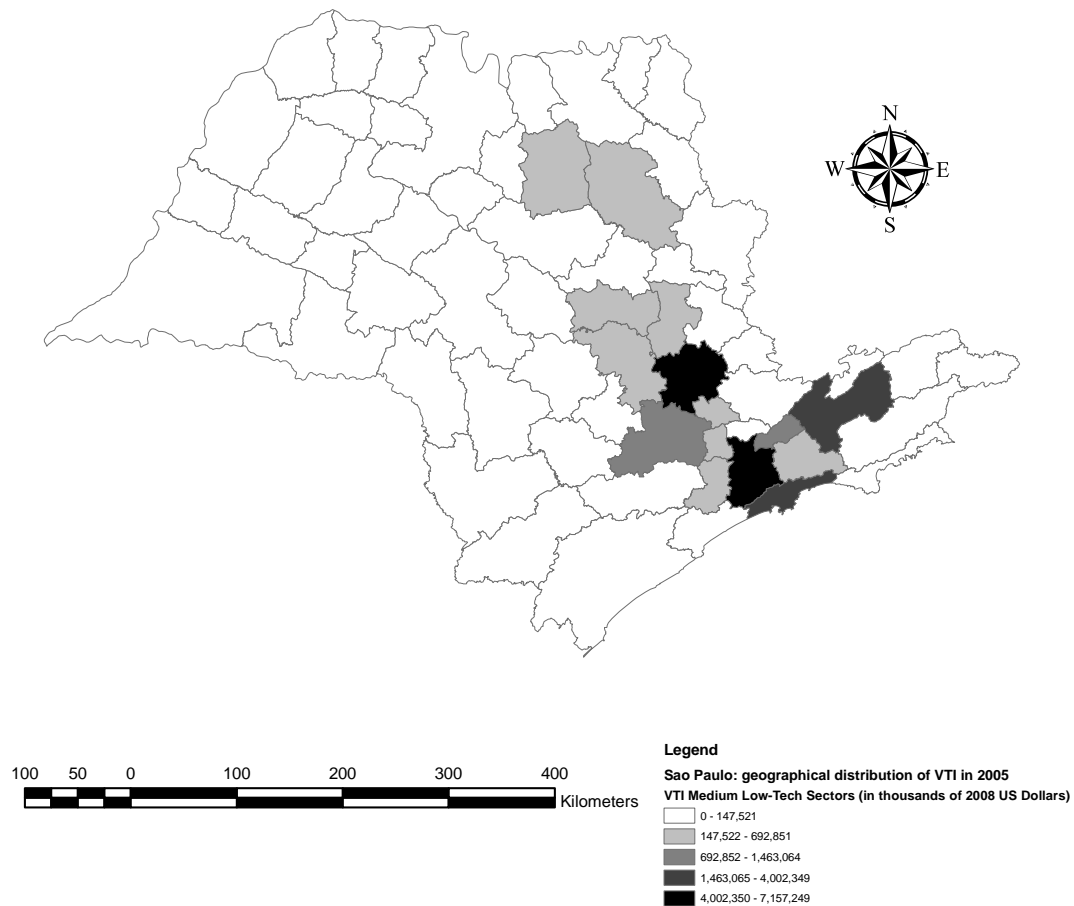
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
Medium High-Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

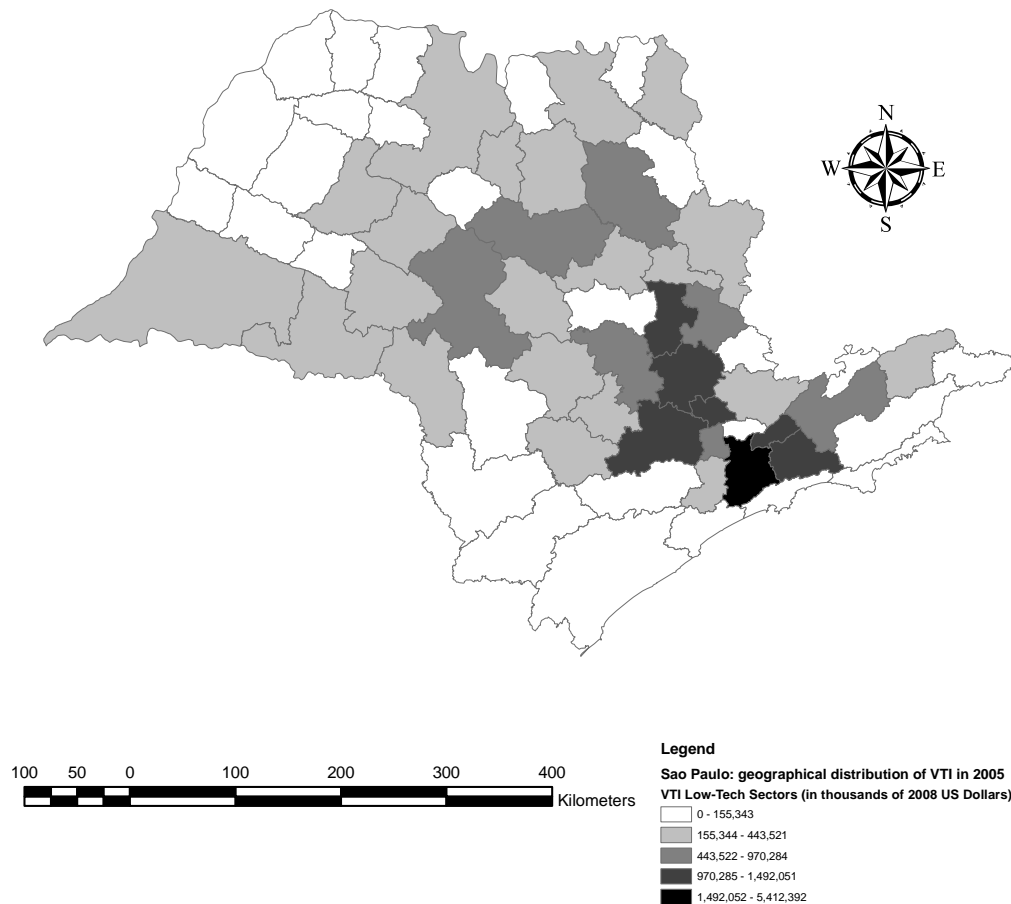
**Sao Paulo: regional distribution of
the Value of Industrial Transformation (VTI) in 2005
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulações Especiais).
Fundação SEADE, Informação dos Municípios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of the Value of Industrial Transformation (VTI) in 2005 Low-Tech Sectors (1)



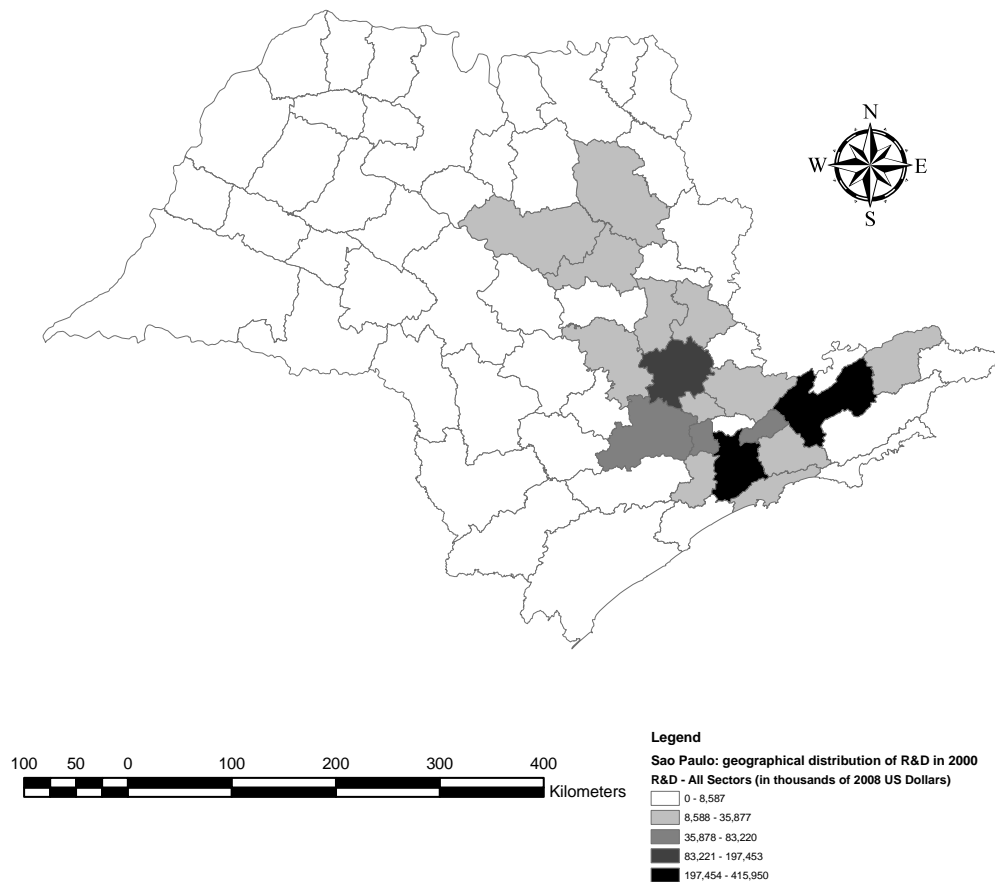
(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Map Set 3.2

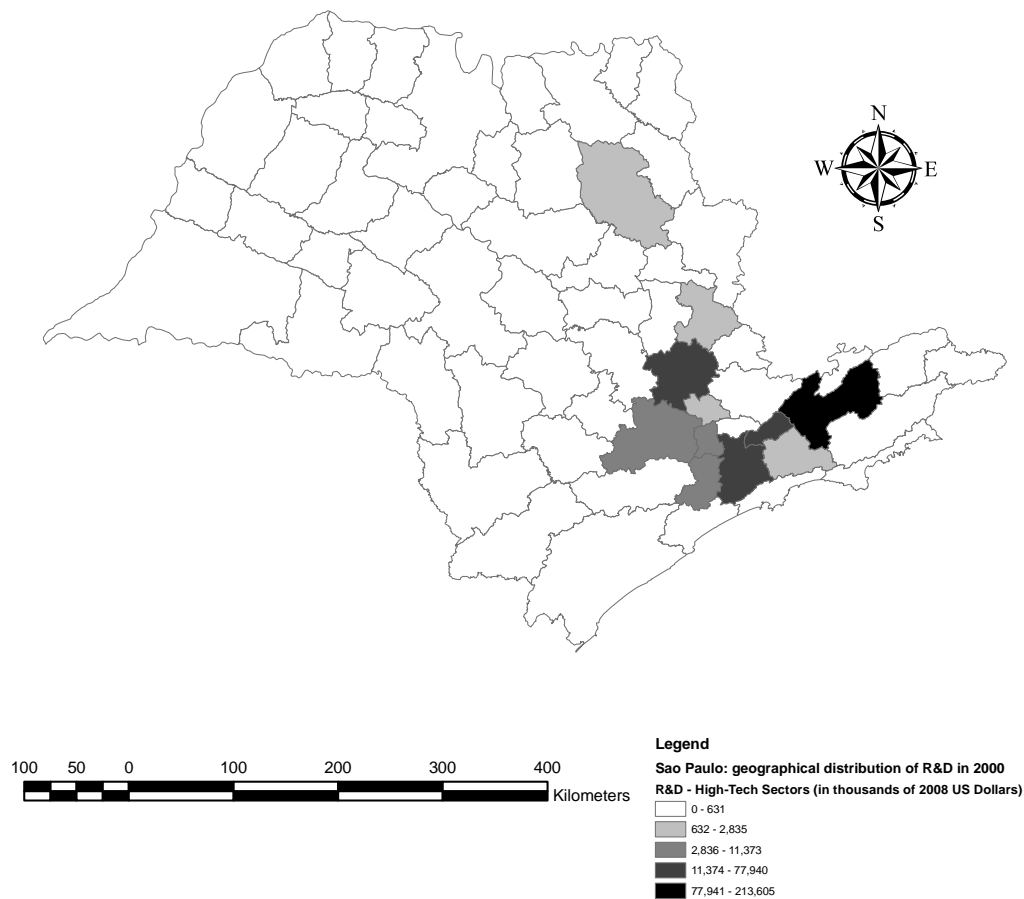
*Regional Distribution of R&D
Investments in the State of São
Paulo by
Technological Classification
(Manufacturing Sectors)
(2000, 2003 and 2005)*

**Sao Paulo: regional distribution of
Research and Development (R&D) Expenditures in 2000
All Manufacturing Sectors**



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

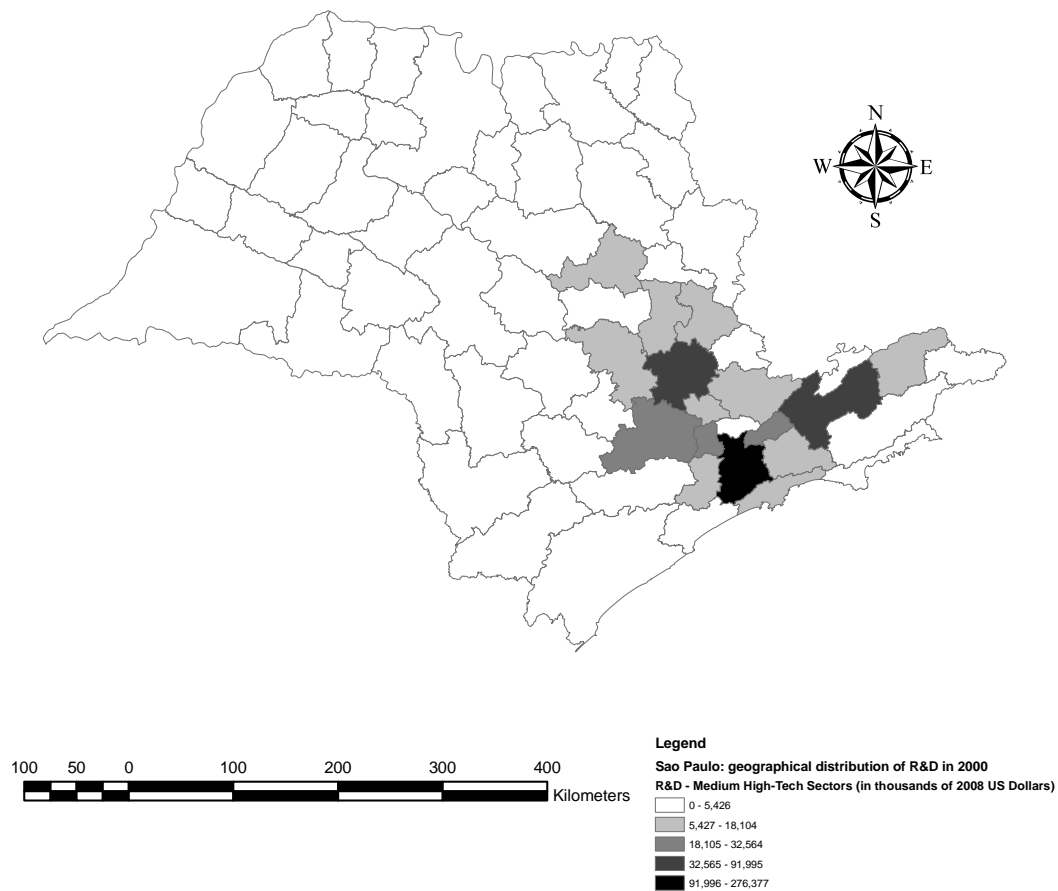
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2000 High-Tech Sectors (1)



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

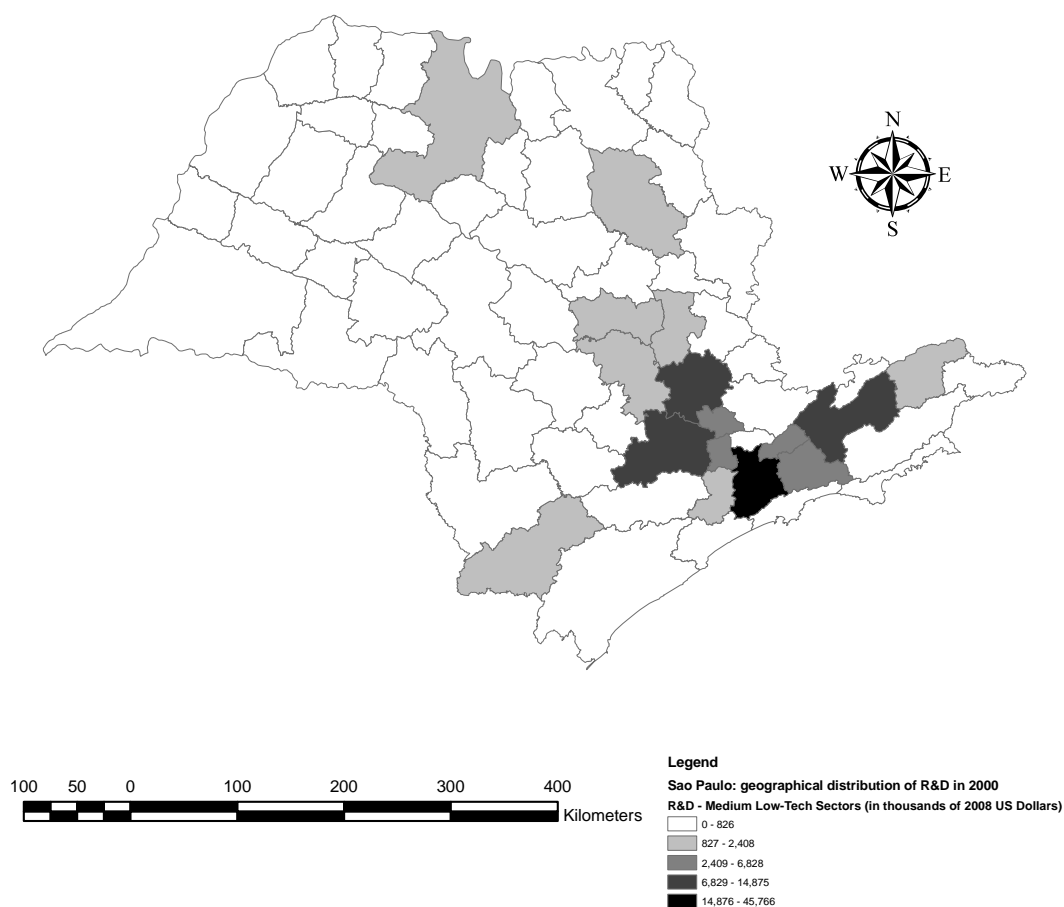
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2000 Medium High-Tech Sectors (1)



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

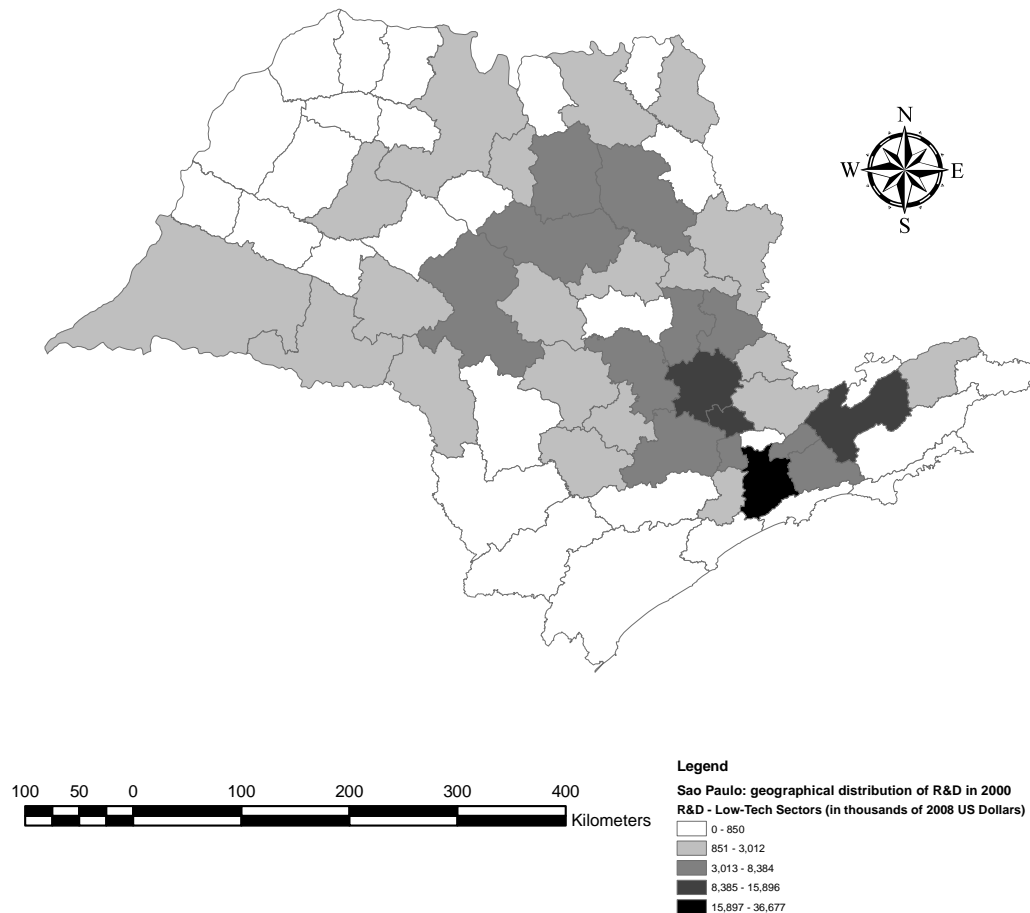
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2000 Medium Low-Tech Sectors (1)



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

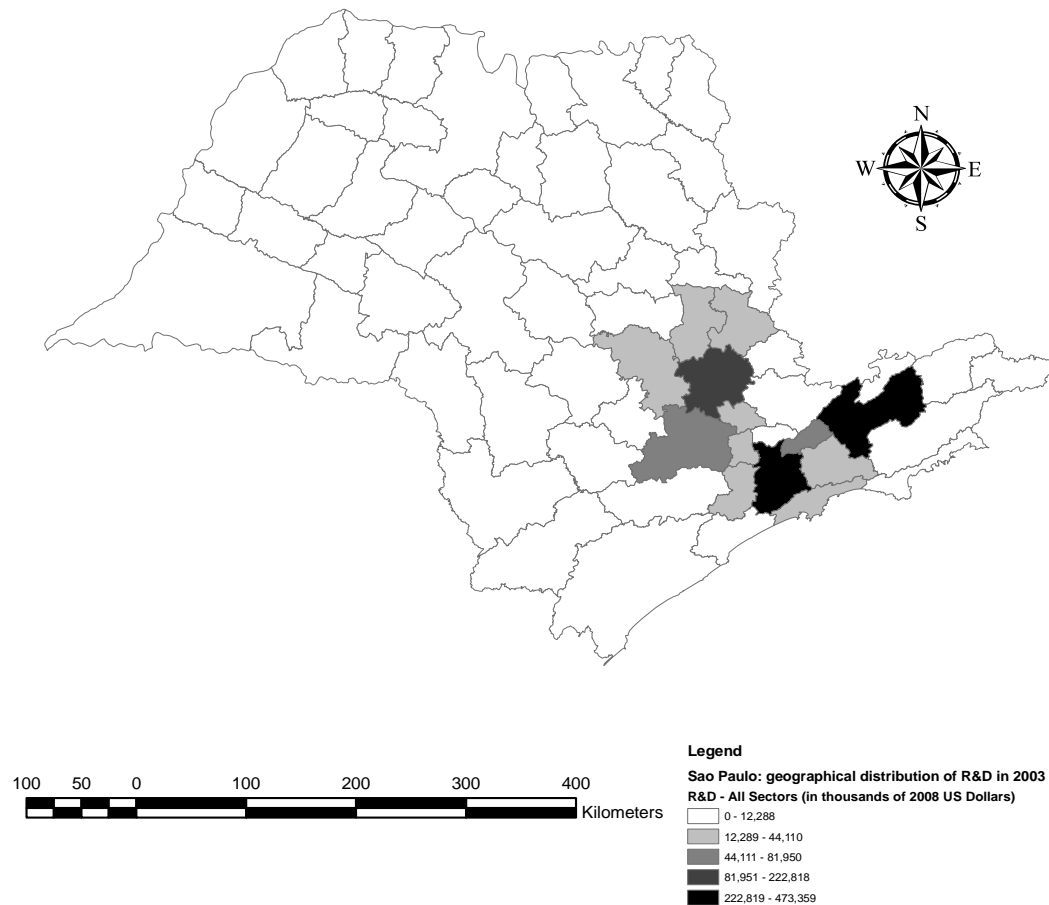
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2000 Low-Tech Sectors (1)



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

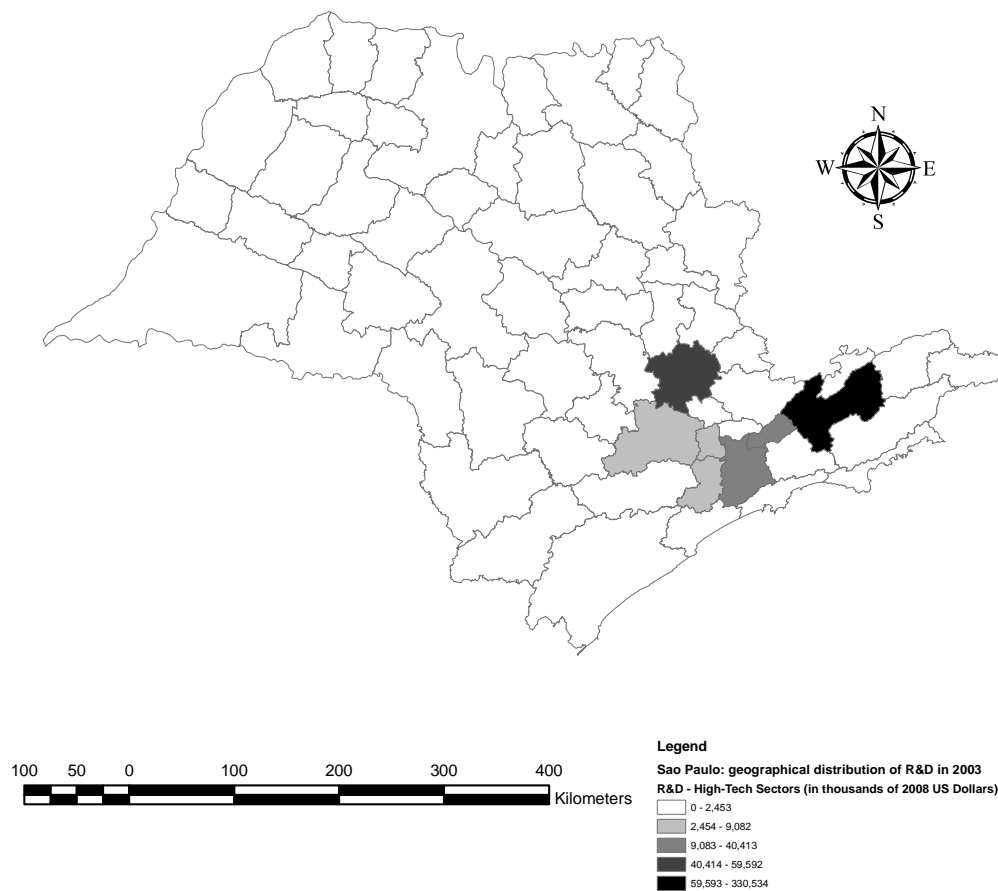
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2003 All Manufacturing Sectors



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

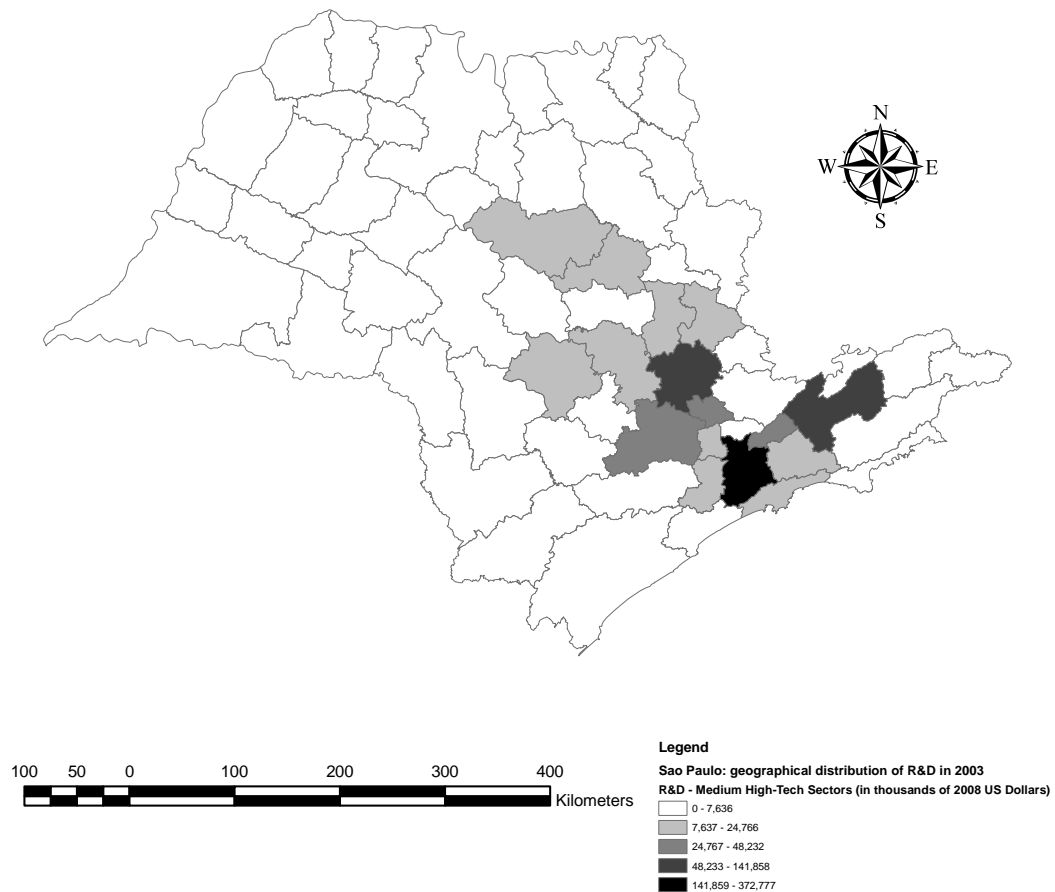
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2003 High-Tech Sectors (1)



(1) High Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

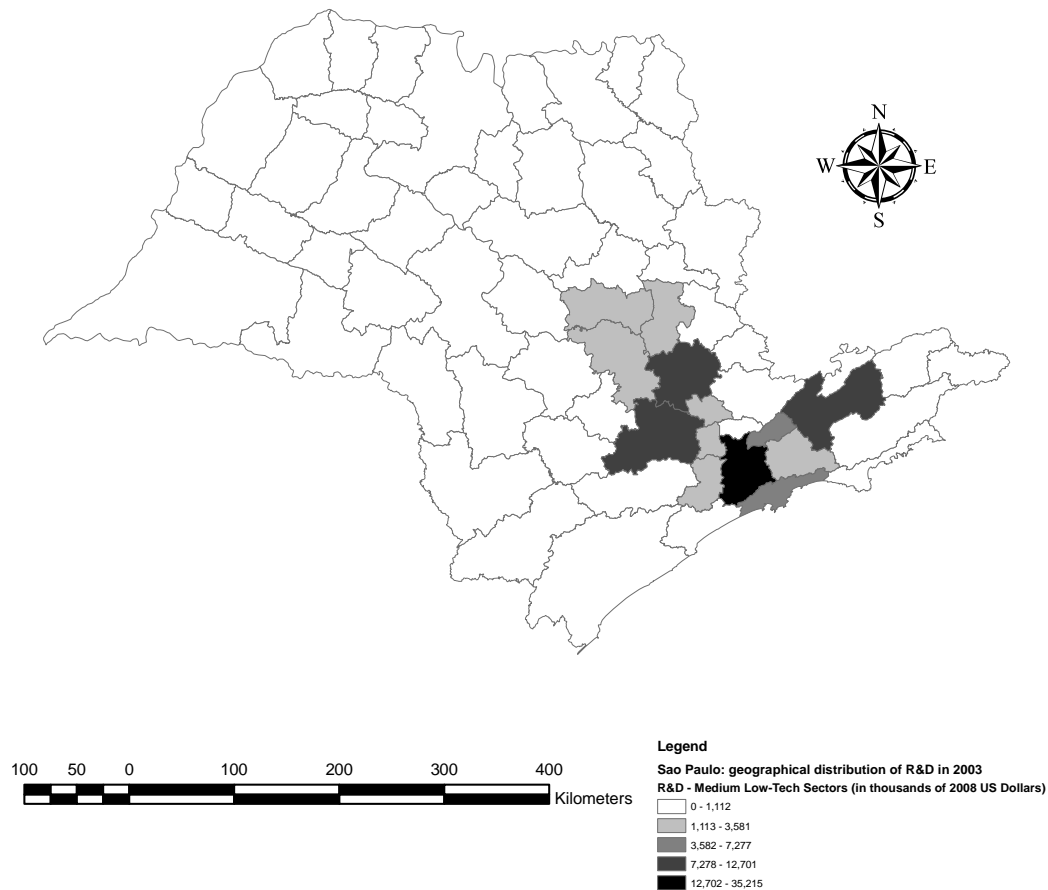
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2003 Medium High-Tech Sectors (1)



(1) Medium High Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
 Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
 Geographic Coordinated System: South American Datum 1969
 Projected Coordinated System: UTM South American Zone 22S

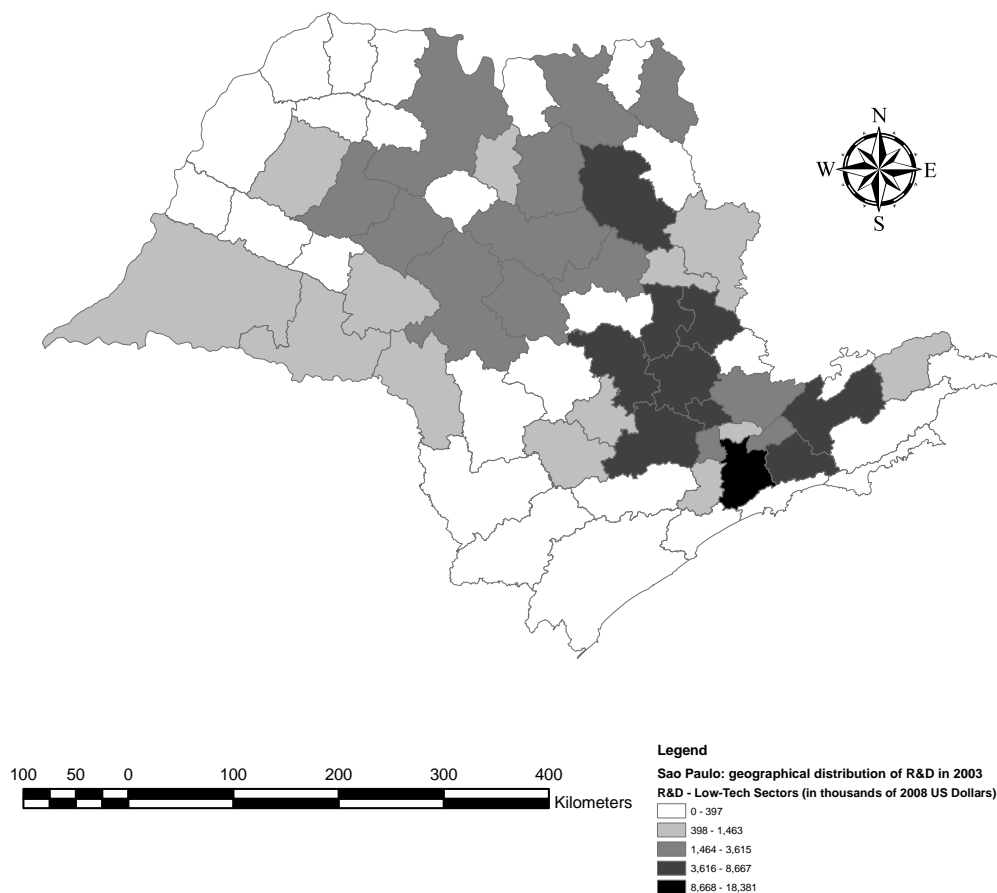
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2003 Medium Low-Tech Sectors (1)



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel;
Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

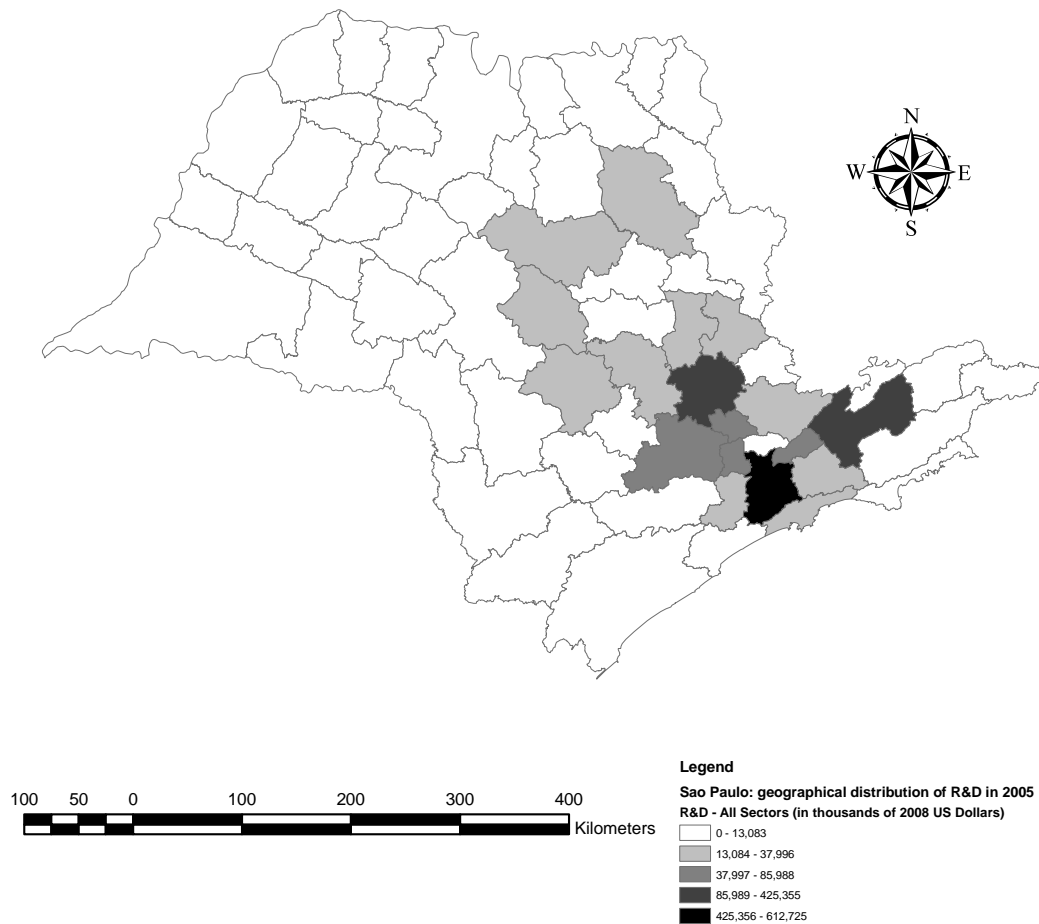
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2003 Low-Tech Sectors (1)



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

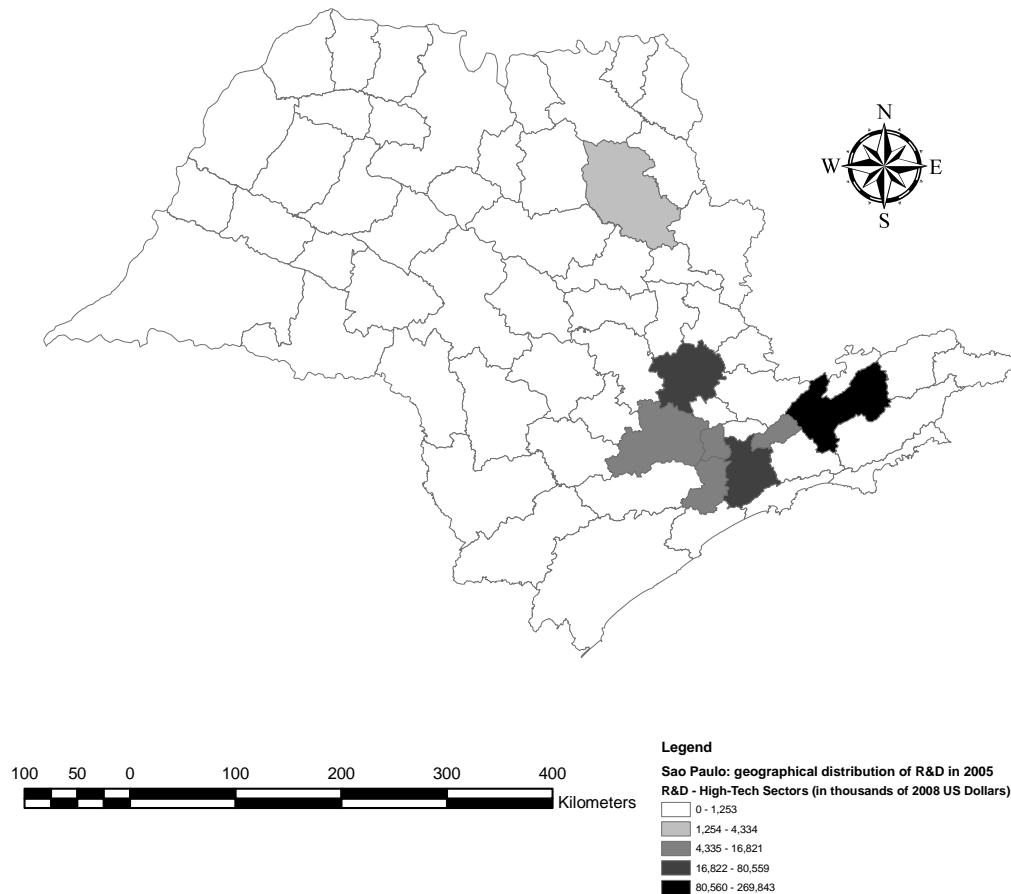
Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2005 All Manufacturing Sectors



Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

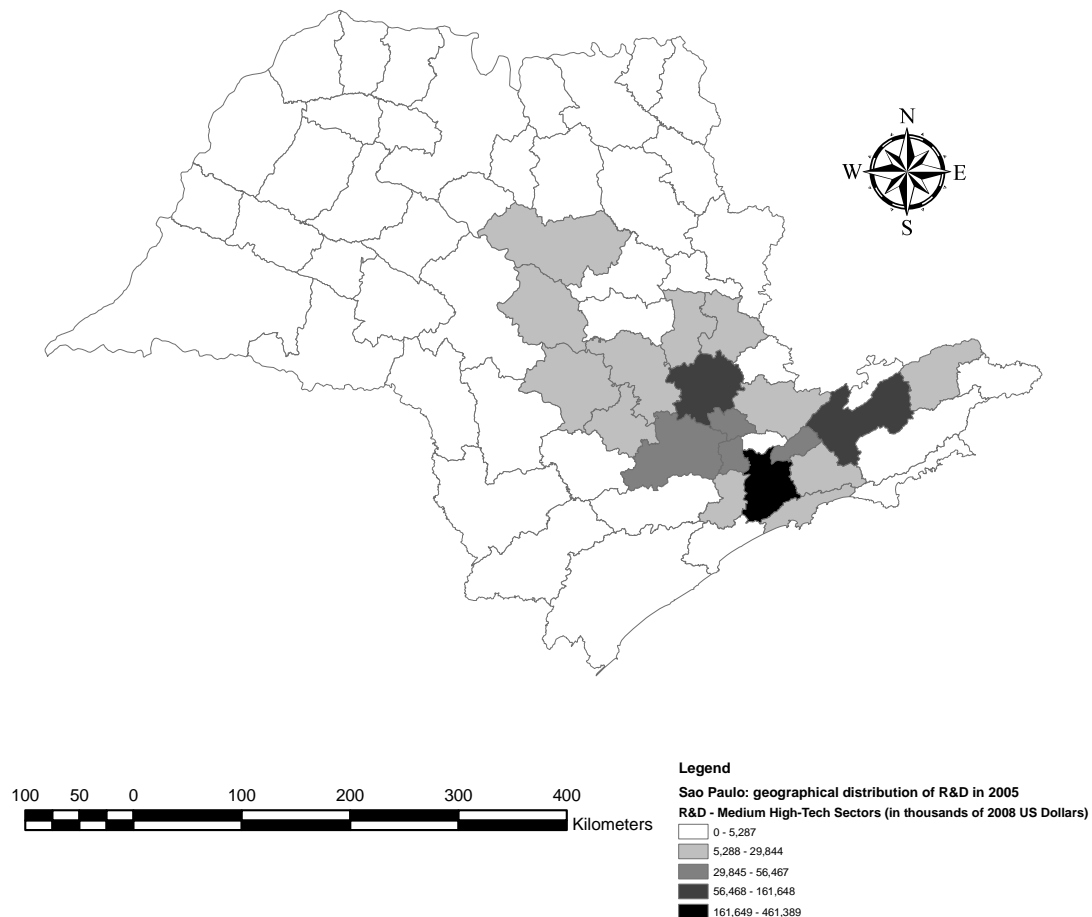
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2005 High-Tech Sectors (1)



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery
Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

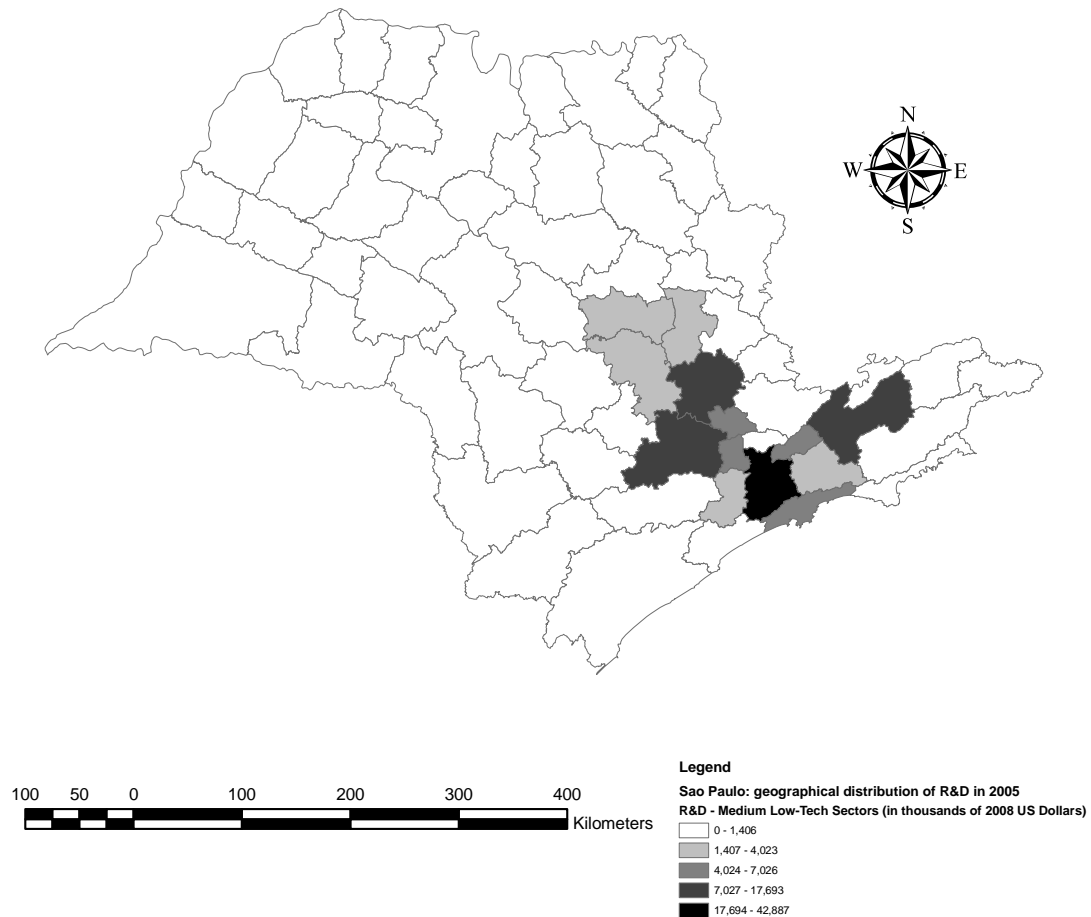
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2005 Medium High-Tech Sectors (1)



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

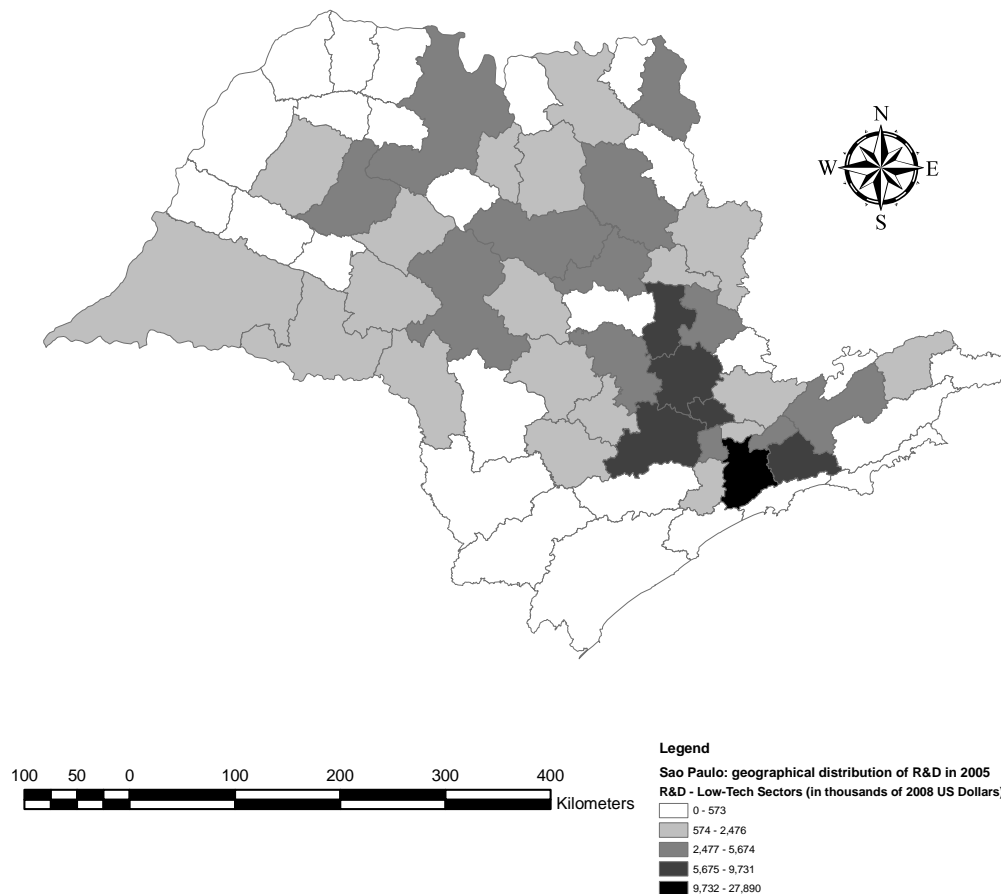
Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2005 Medium Low-Tech Sectors (1)



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel;
Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).
Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)
Geographic Coordinated System: South American Datum 1969
Projected Coordinated System: UTM South American Zone 22S

Sao Paulo: regional distribution of Research and Development (R&D) Expenditures in 2005 Low-Tech Sectors (1)



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

Source: Instituto Brasileiro de Geografia e Estatística (IBGE), Pesquisa Industrial Anual - PIA (Tabulacoes Especiais).

Fundacao SEADE, Informacao dos Municipios Paulistas (Valor Adicionado Fiscal)

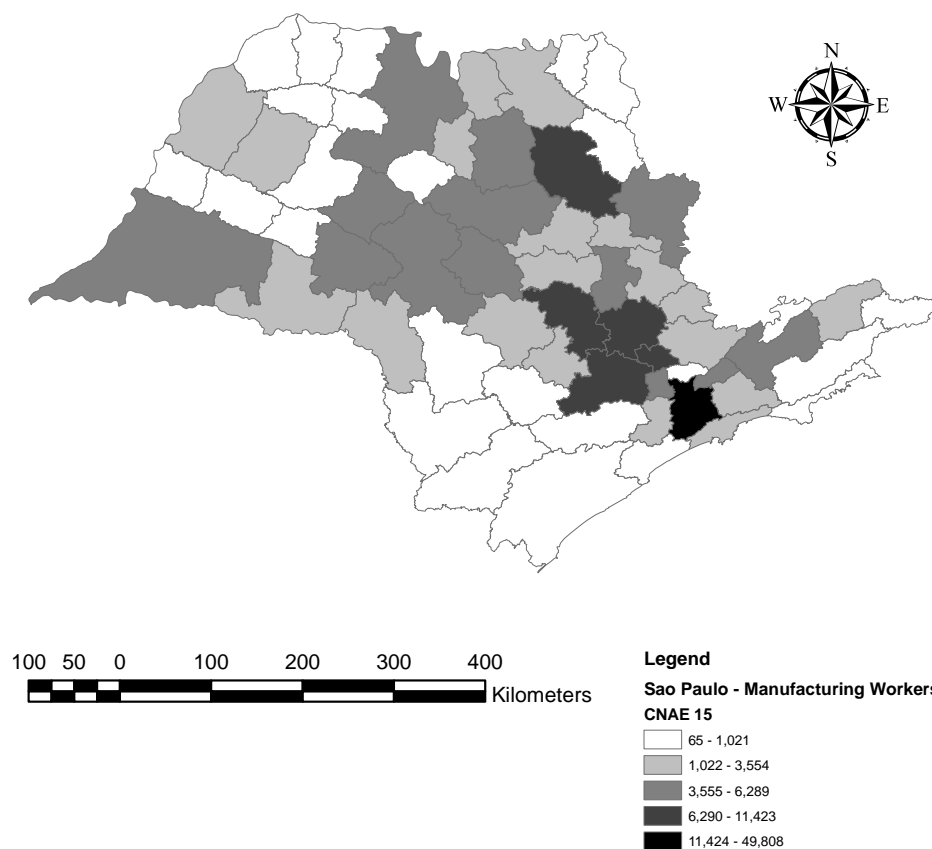
Geographic Coordinated System: South American Datum 1969

Projected Coordinated System: UTM South American Zone 22S

Map Set 3.3

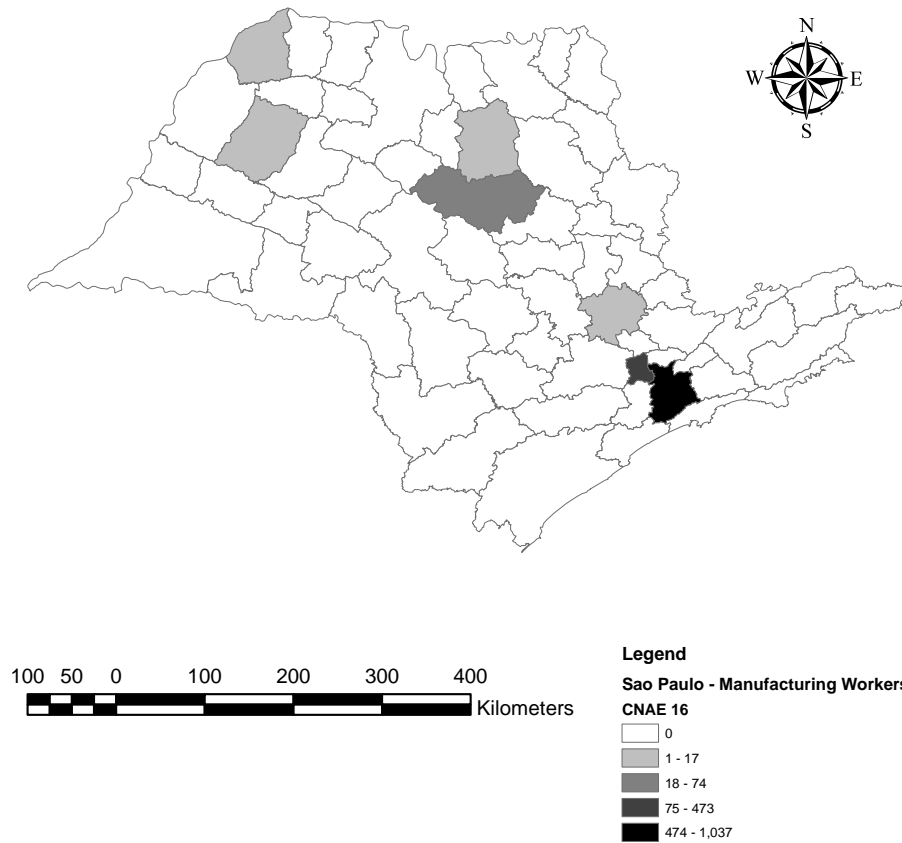
*Regional Distribution of
Manufacturing-Related Workers in
the State of São Paulo by
Industrial Divisions (CNAE and
ISIC Rev.3) and Technological
Classification
(2000, 2003 and 2005)*

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



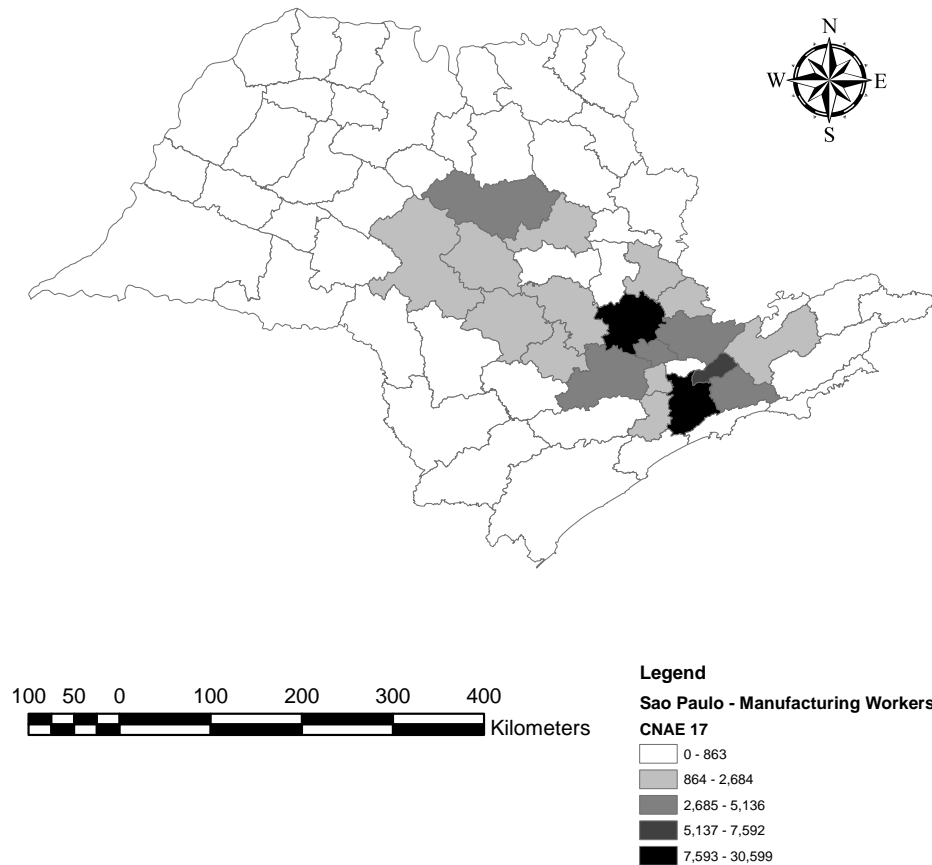
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 16
(Manufacture of tobacco products)**



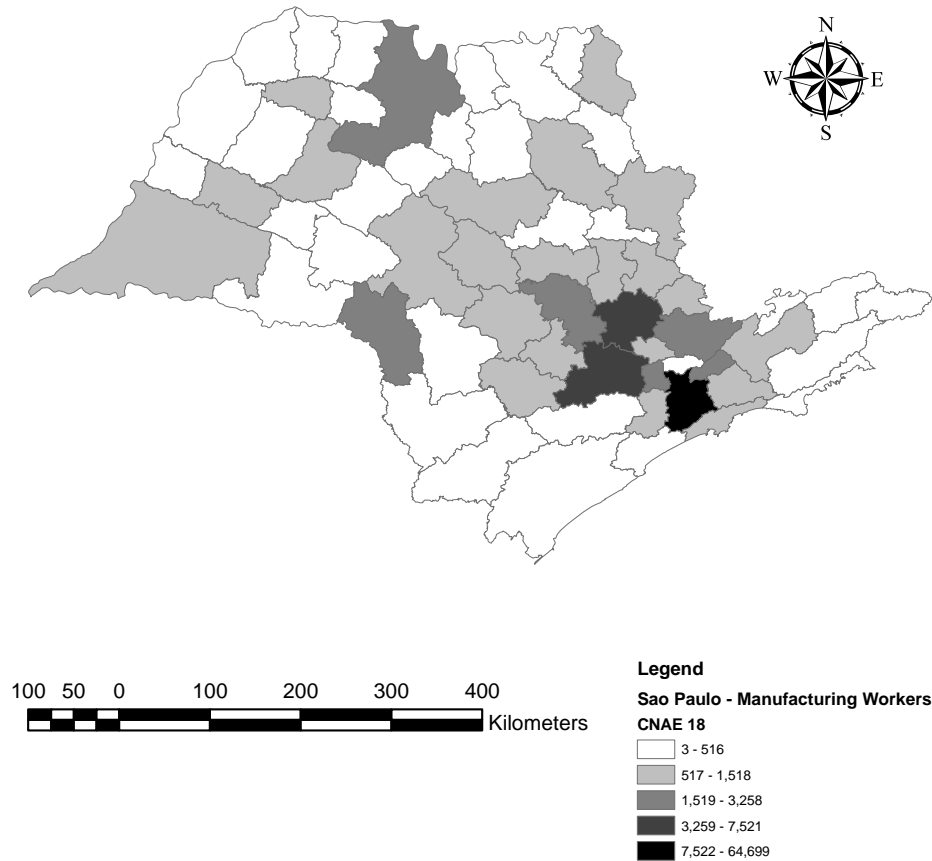
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



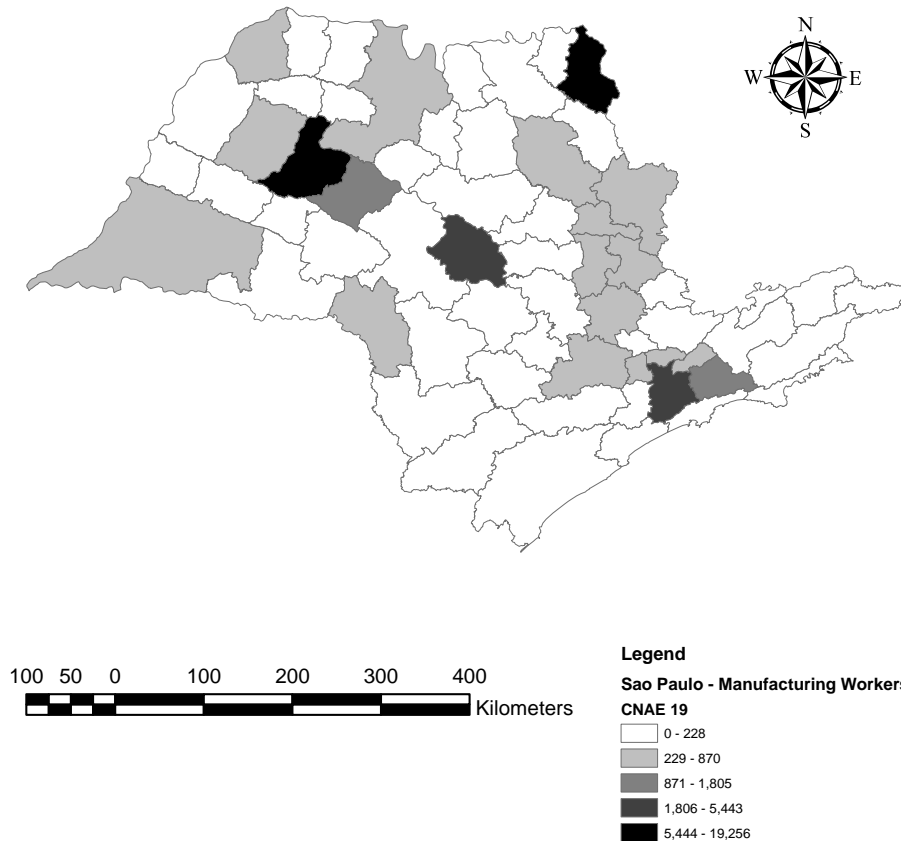
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)**



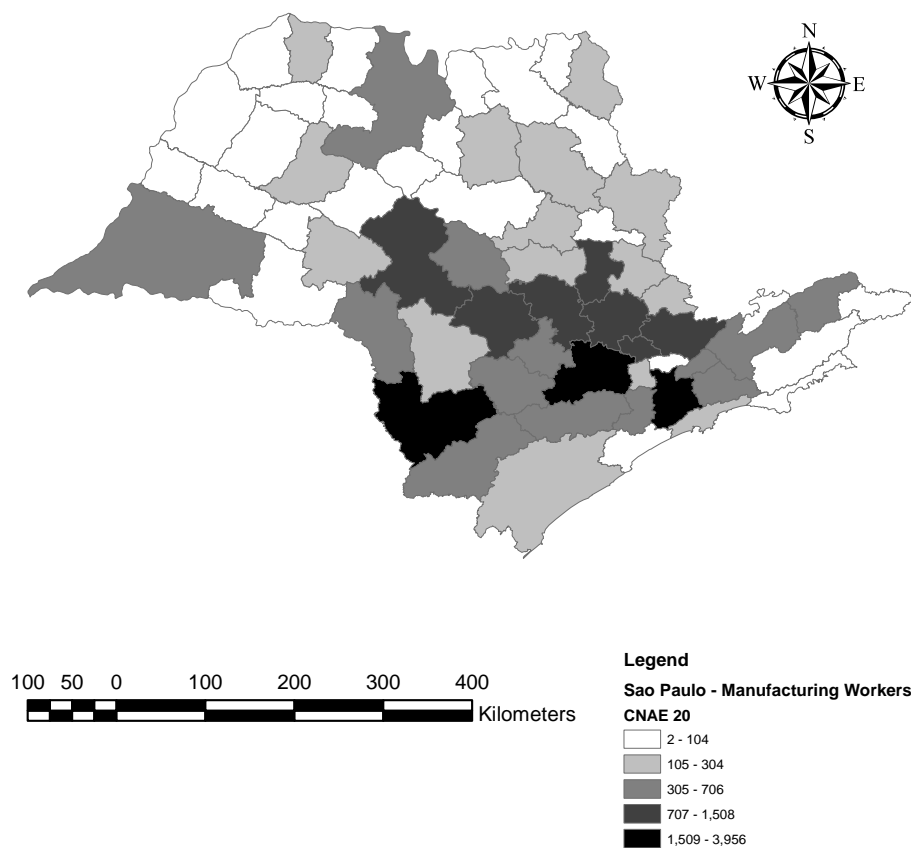
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



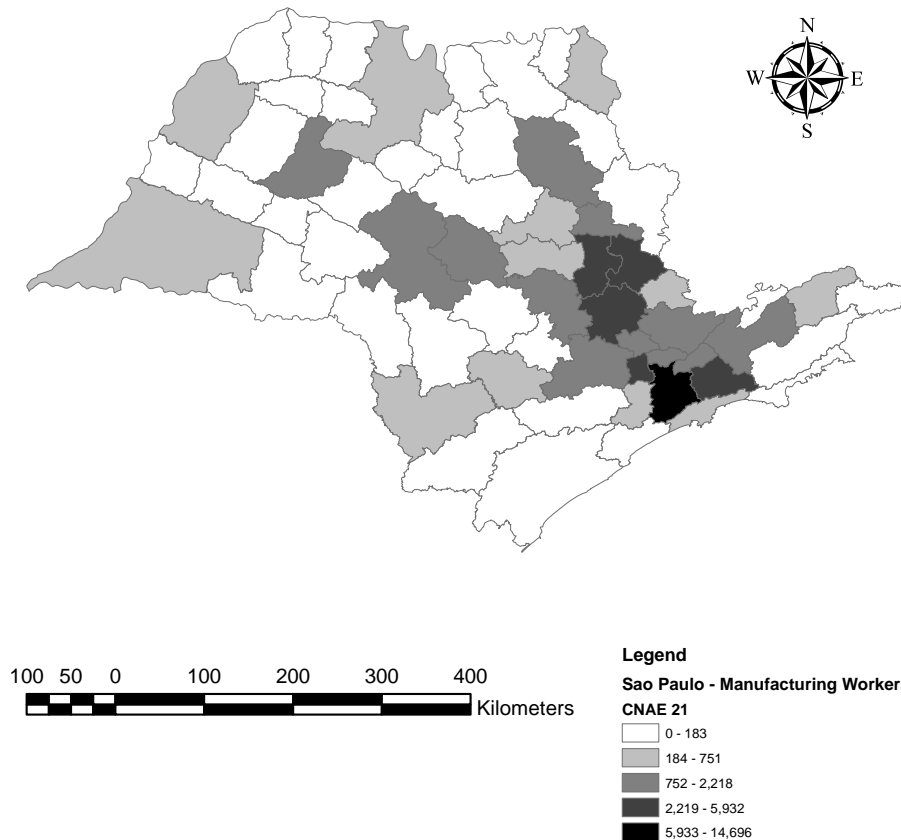
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



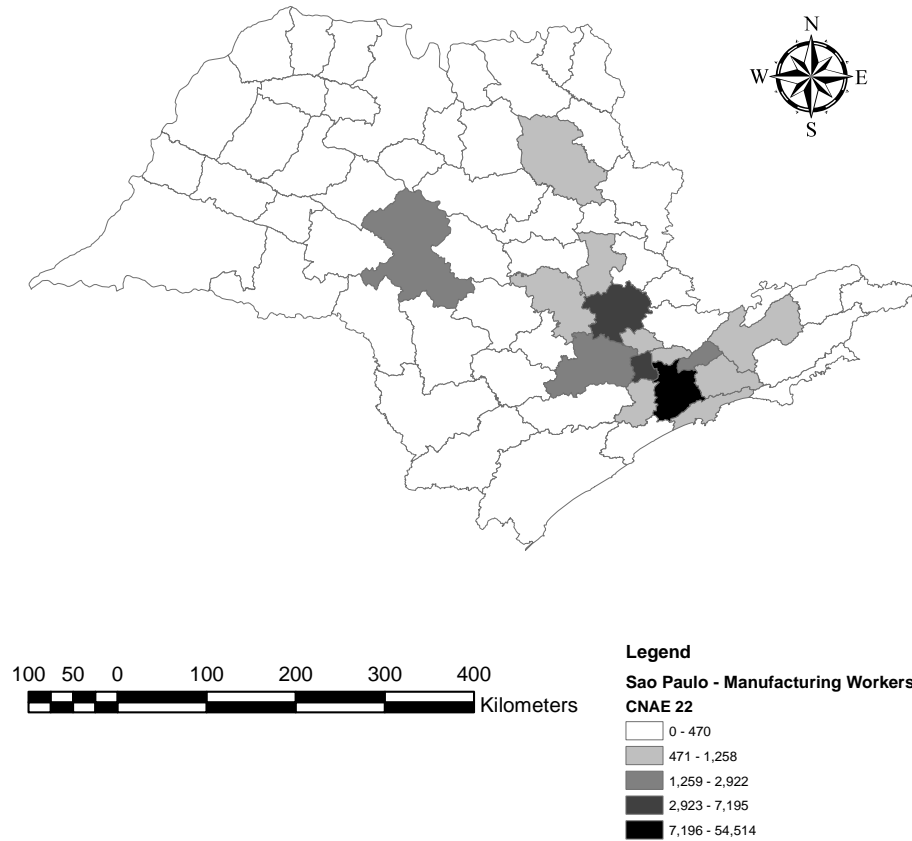
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



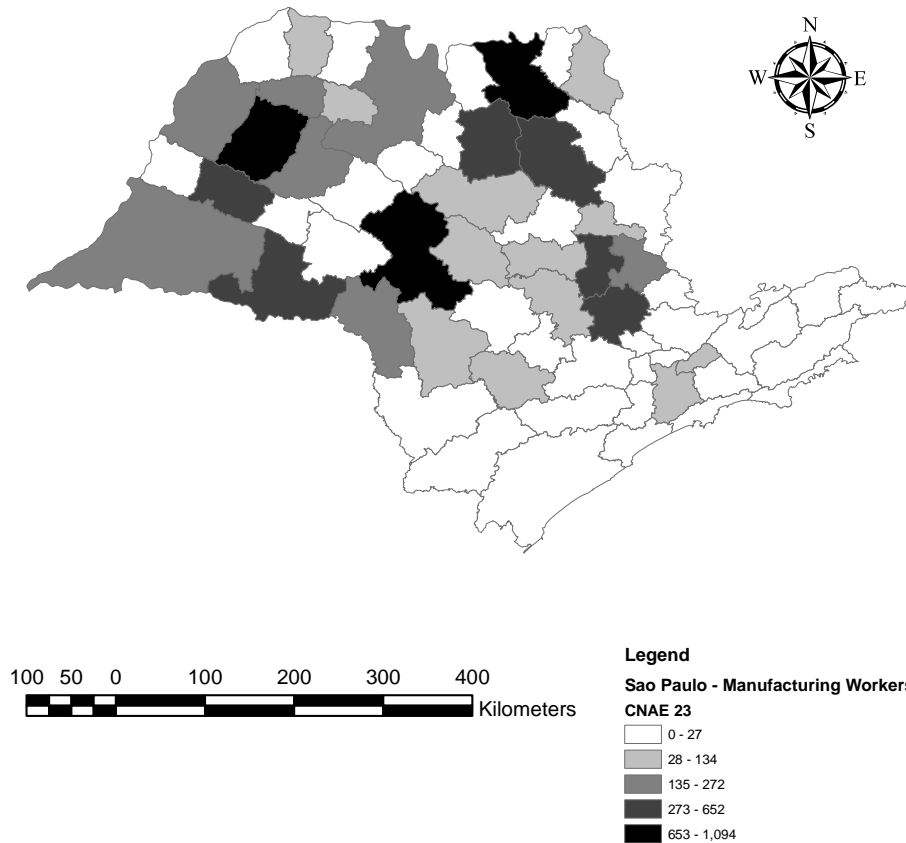
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



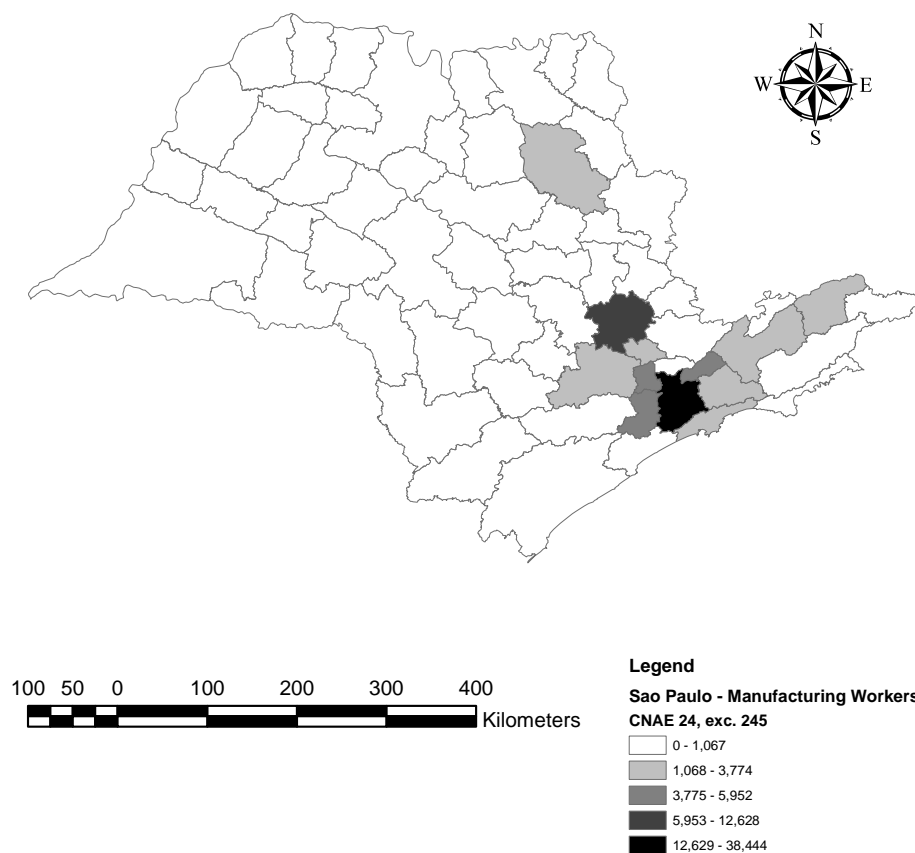
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)**



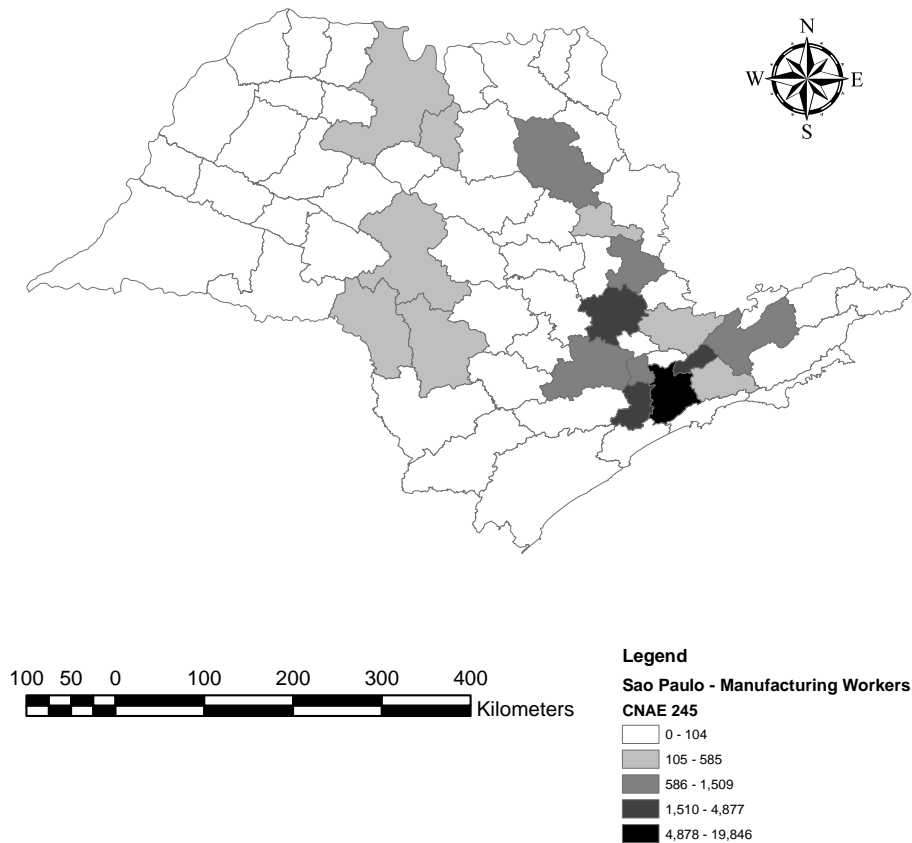
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE 24/ISIC (Rev.3) 24, exc.
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



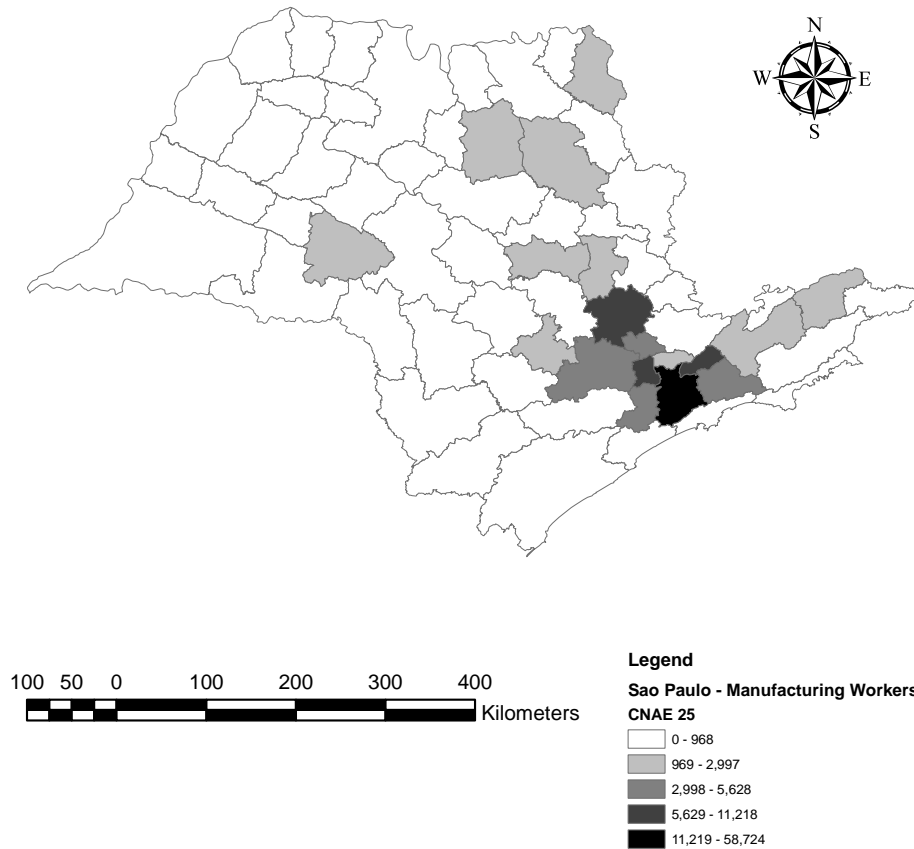
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



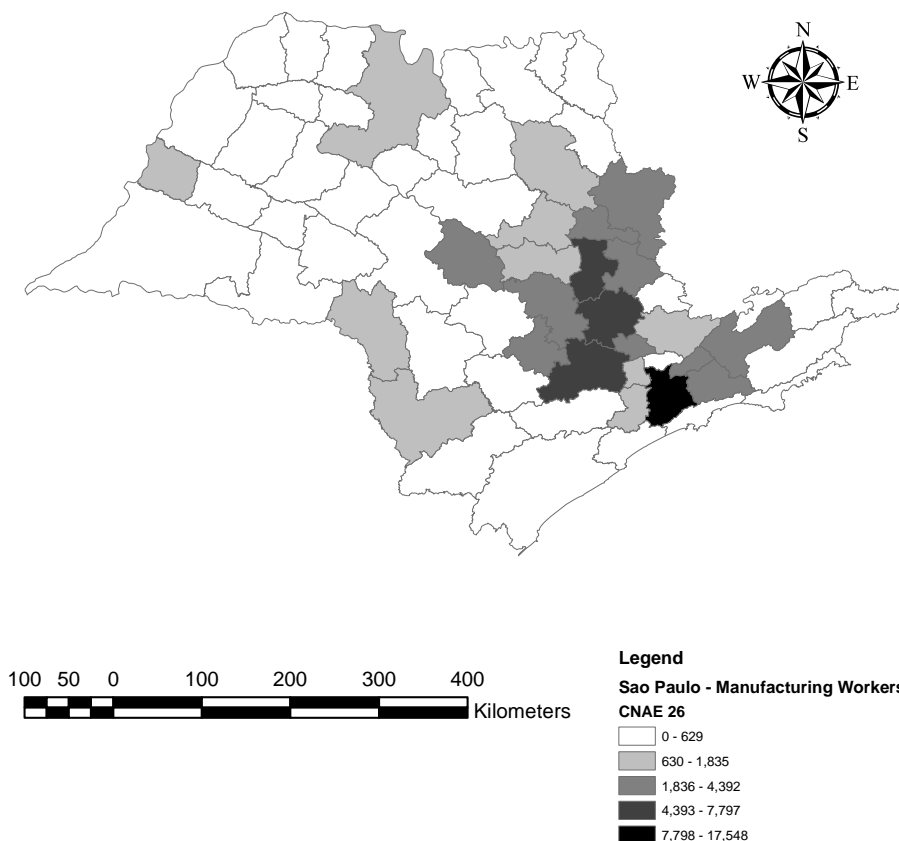
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



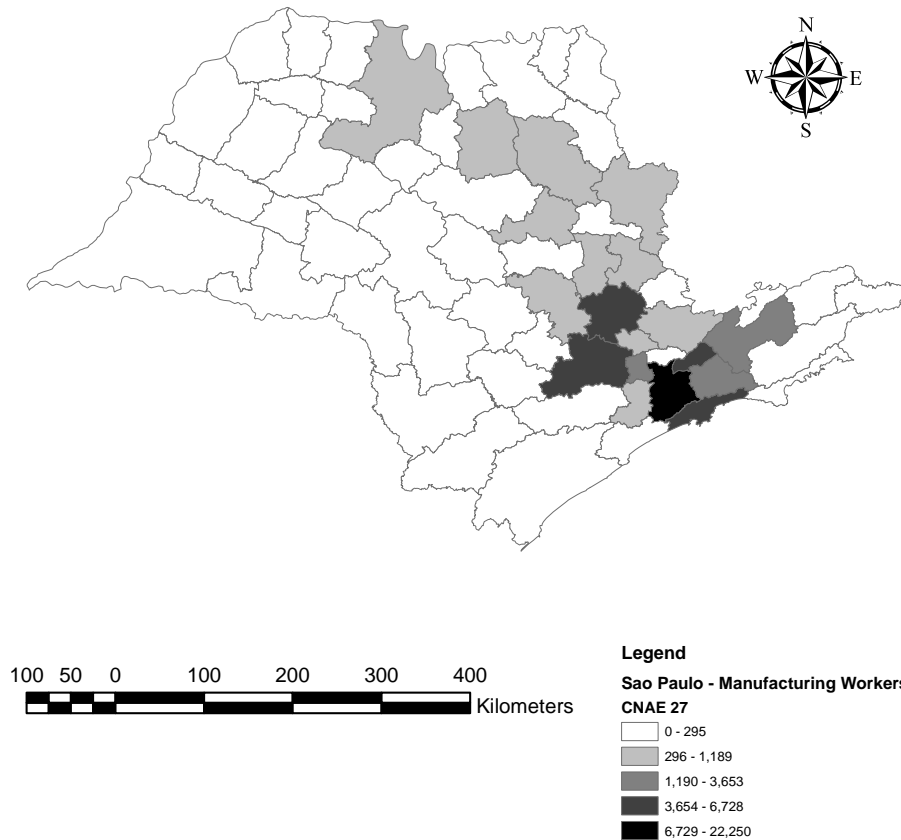
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



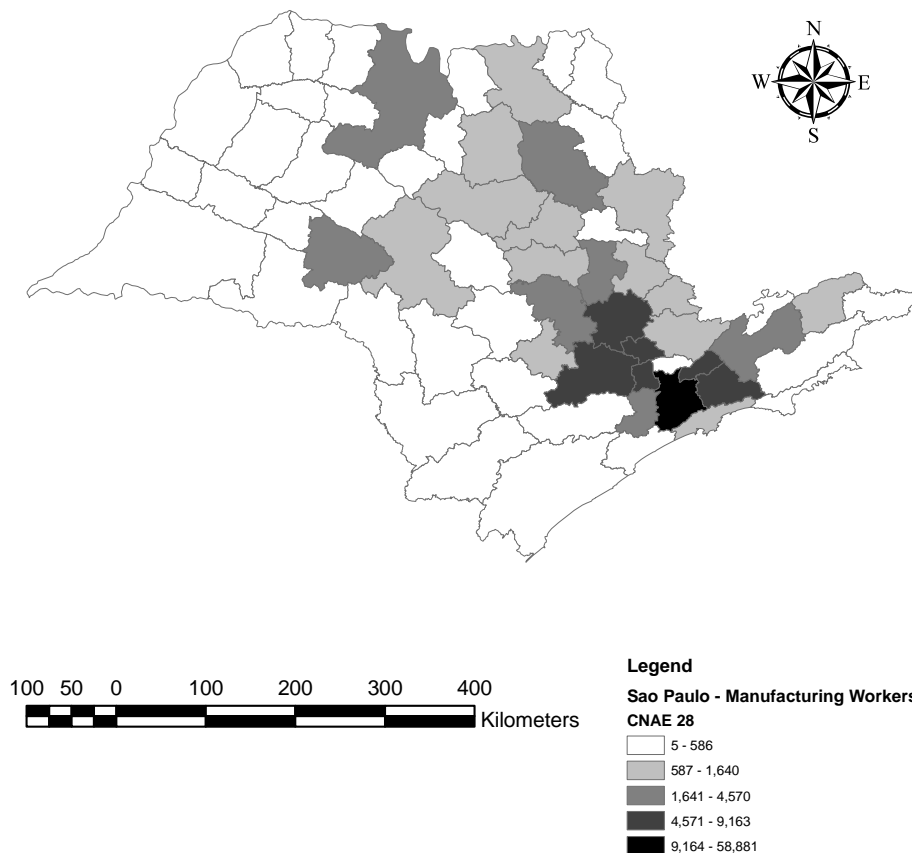
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



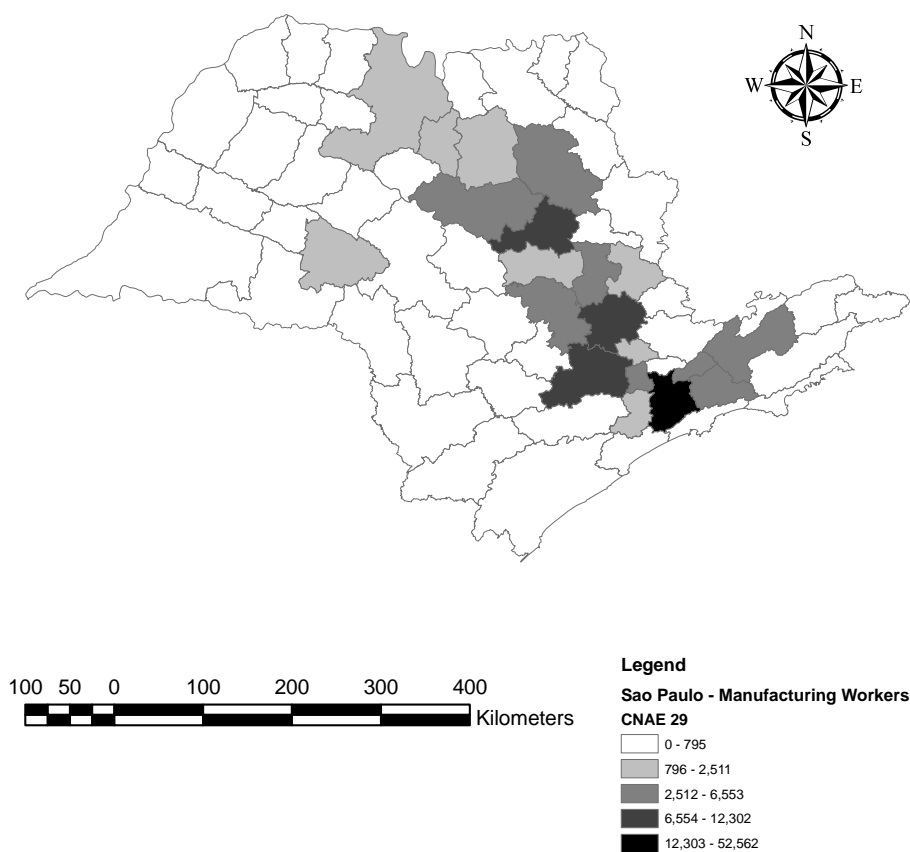
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



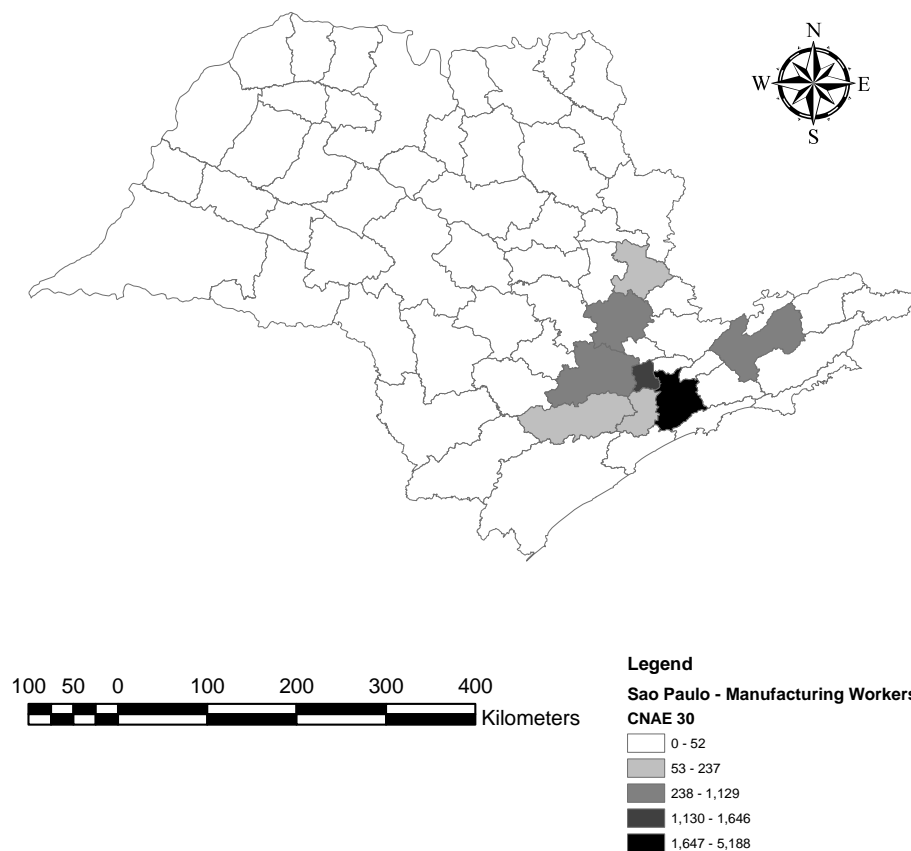
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c)**



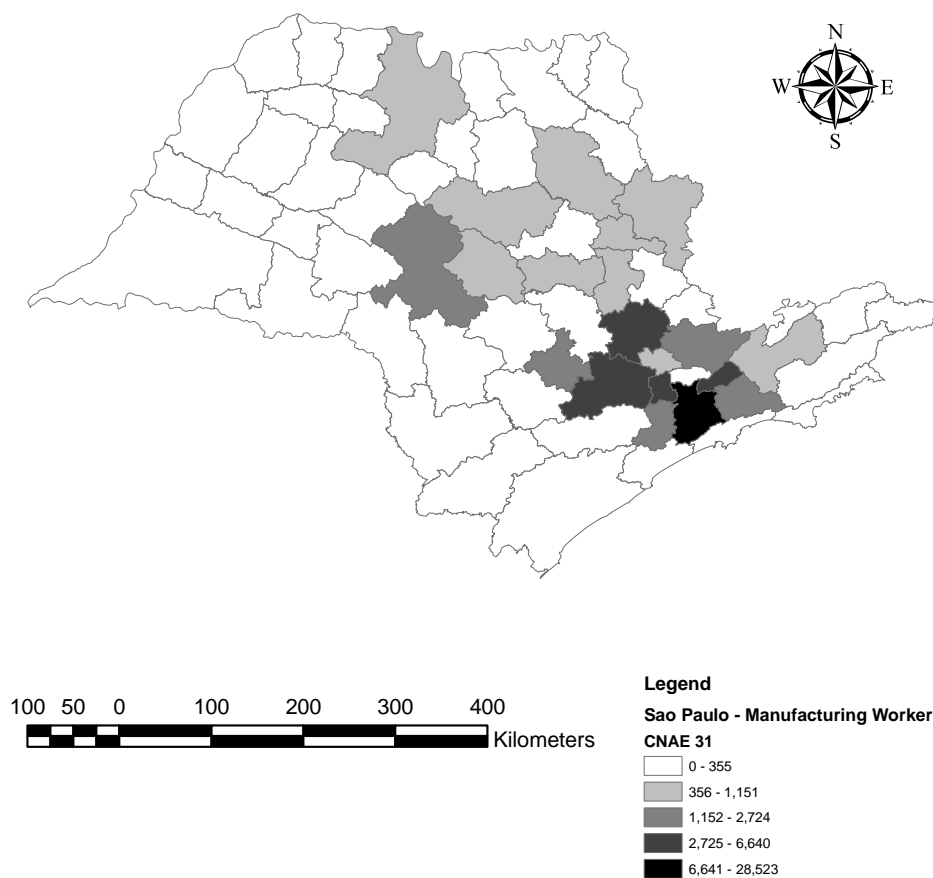
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting and
computing machinery)**



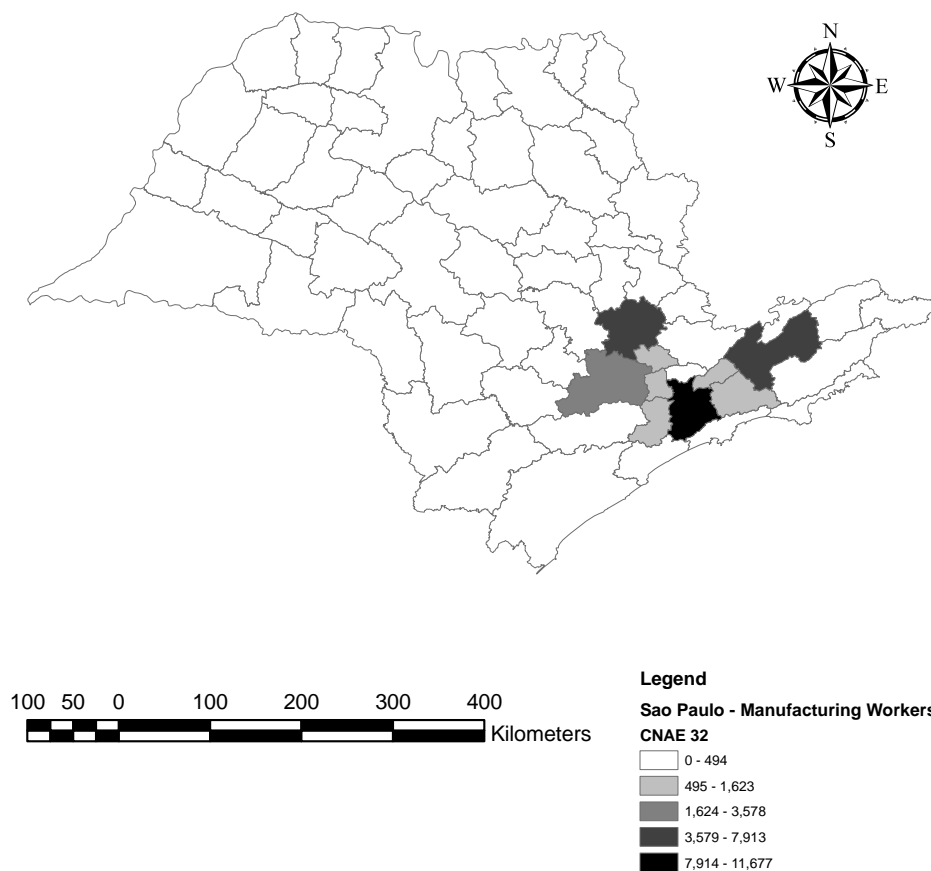
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



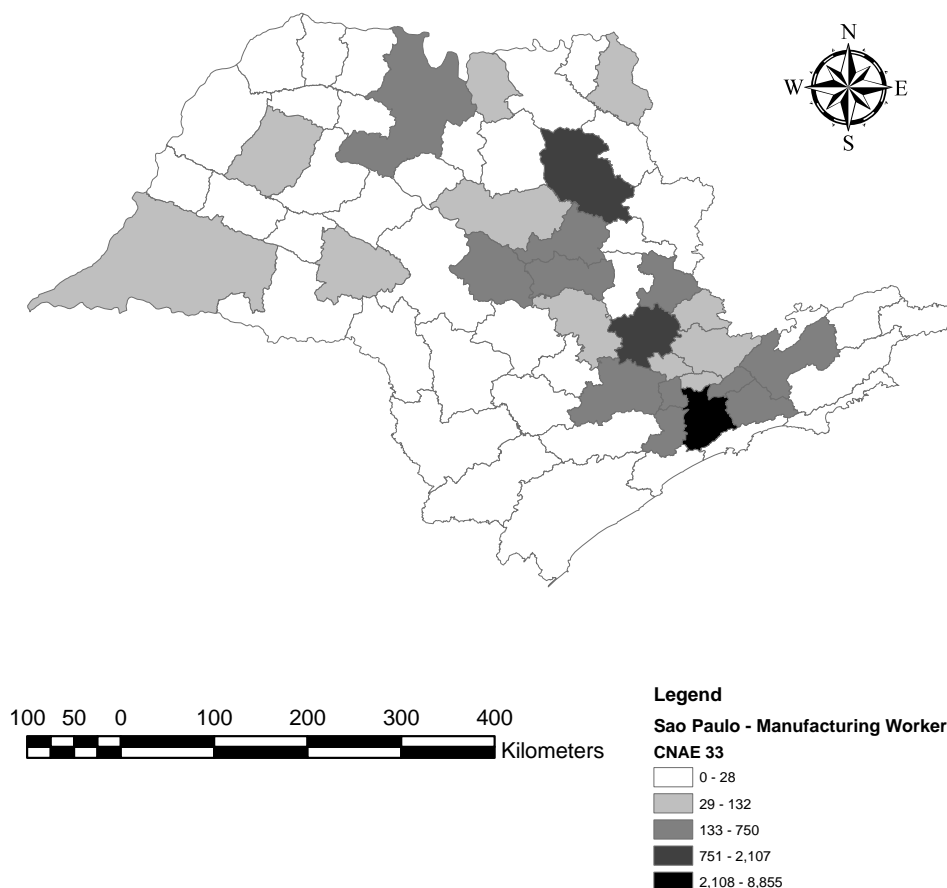
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and
communication equipment and apparatus)**



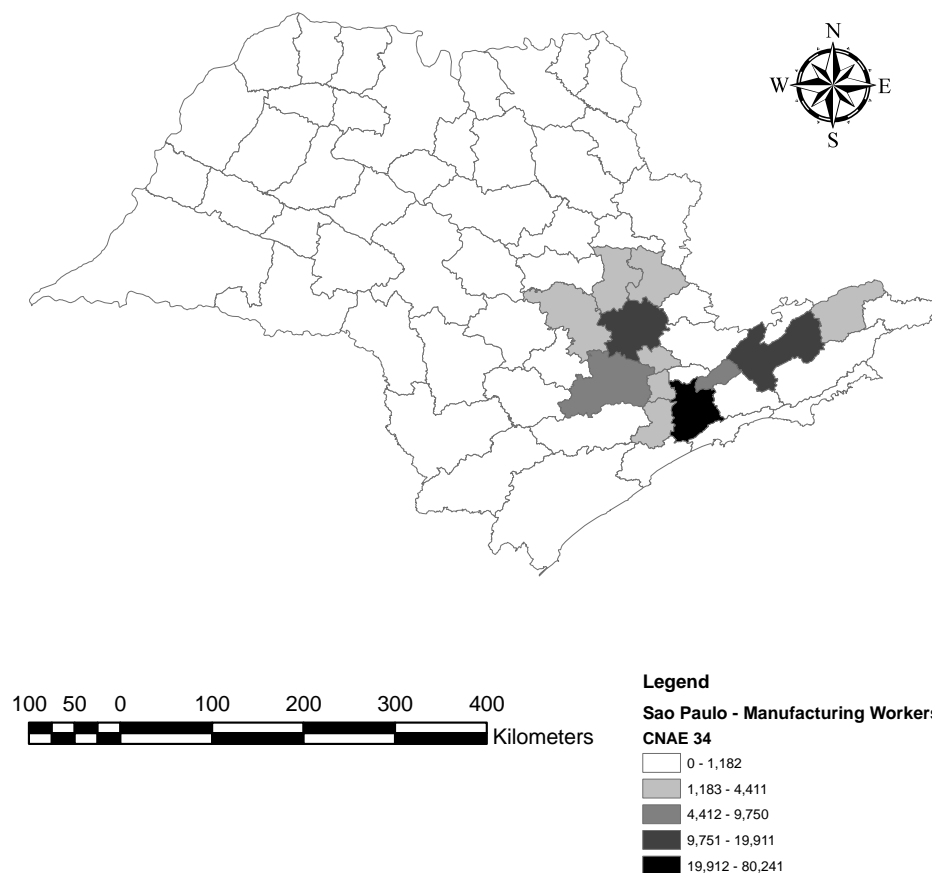
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)***



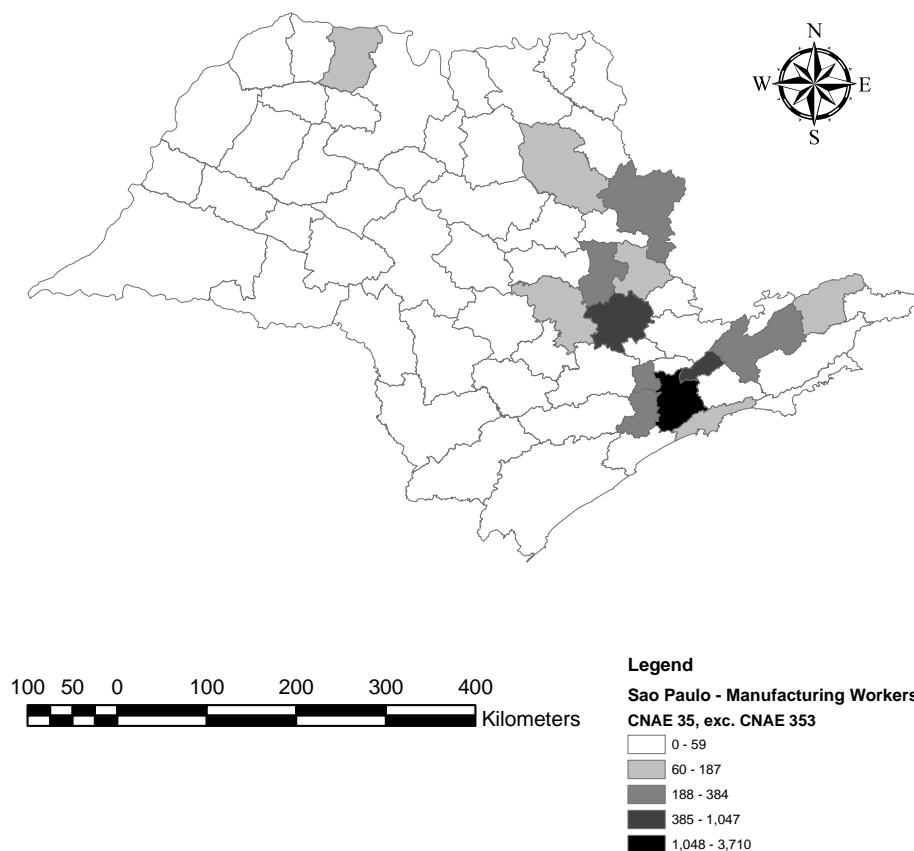
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



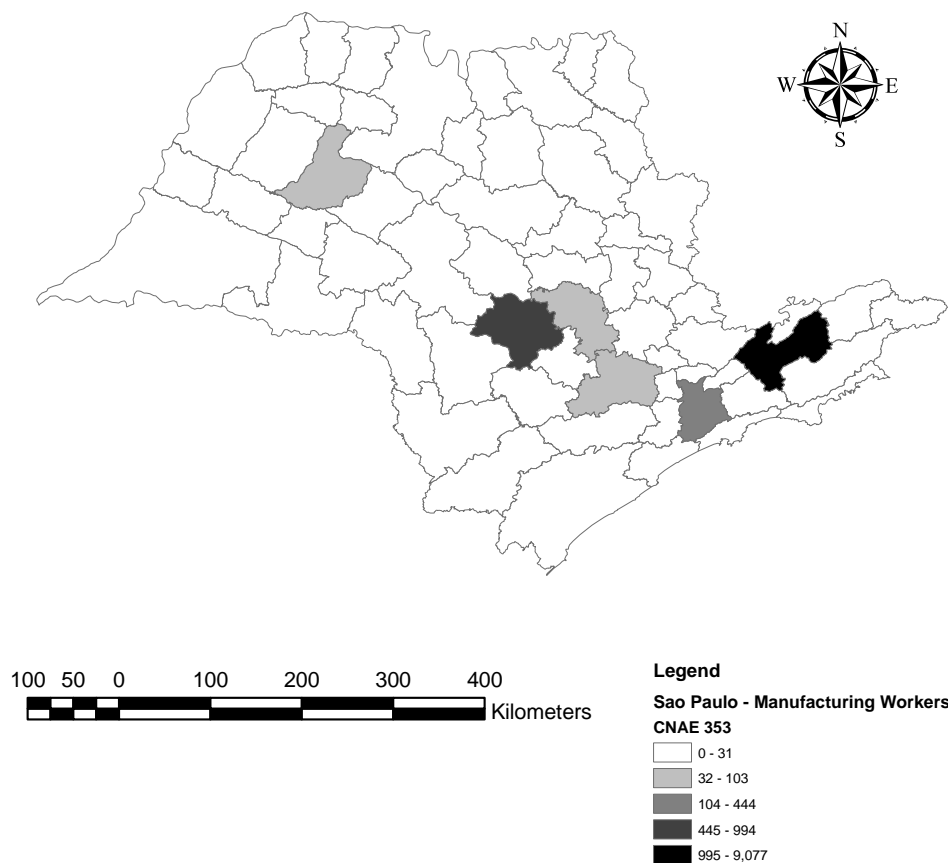
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



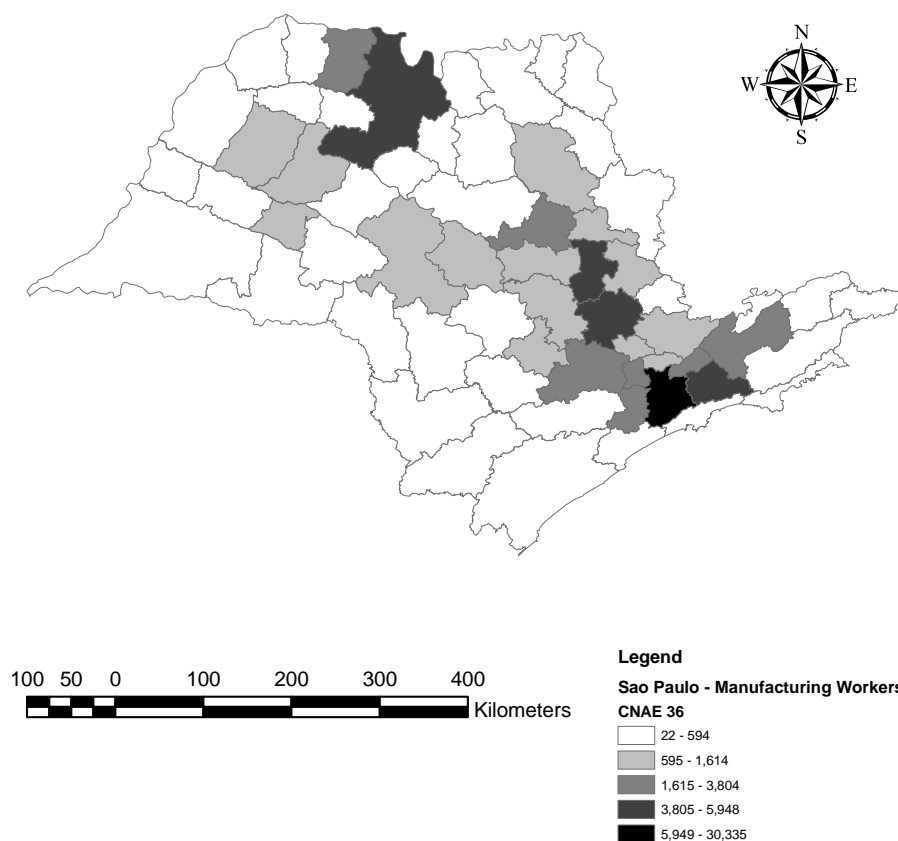
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE 353/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



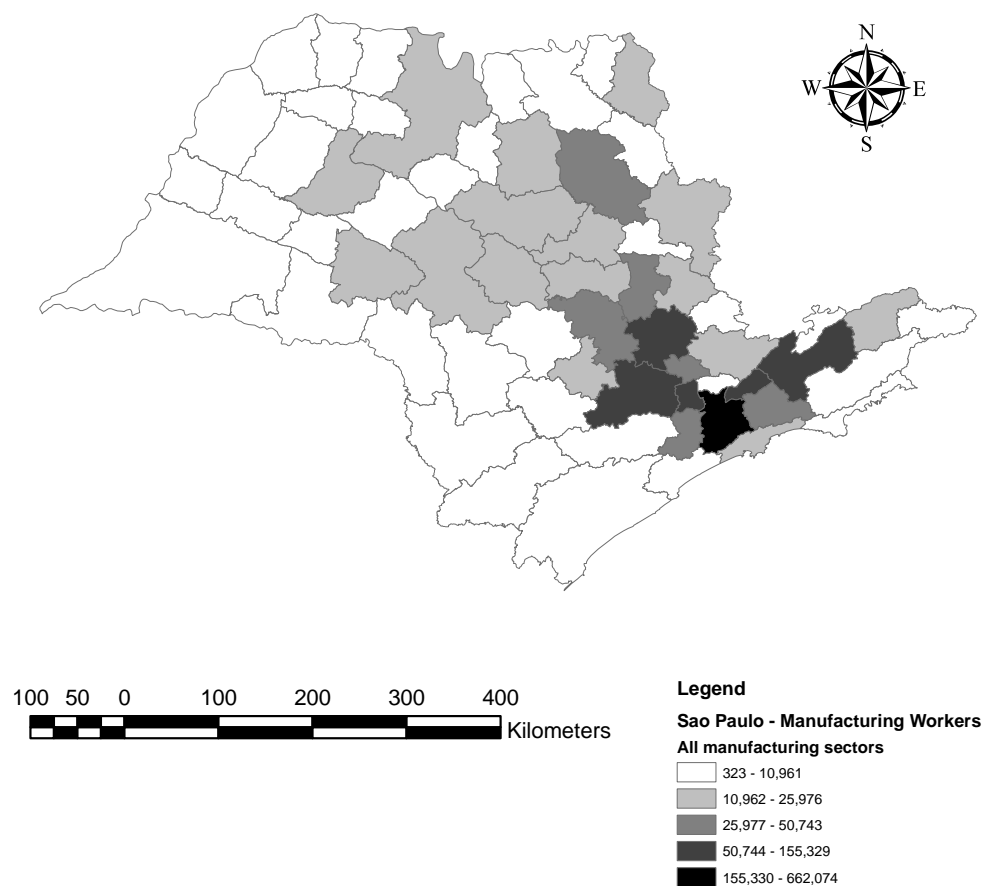
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



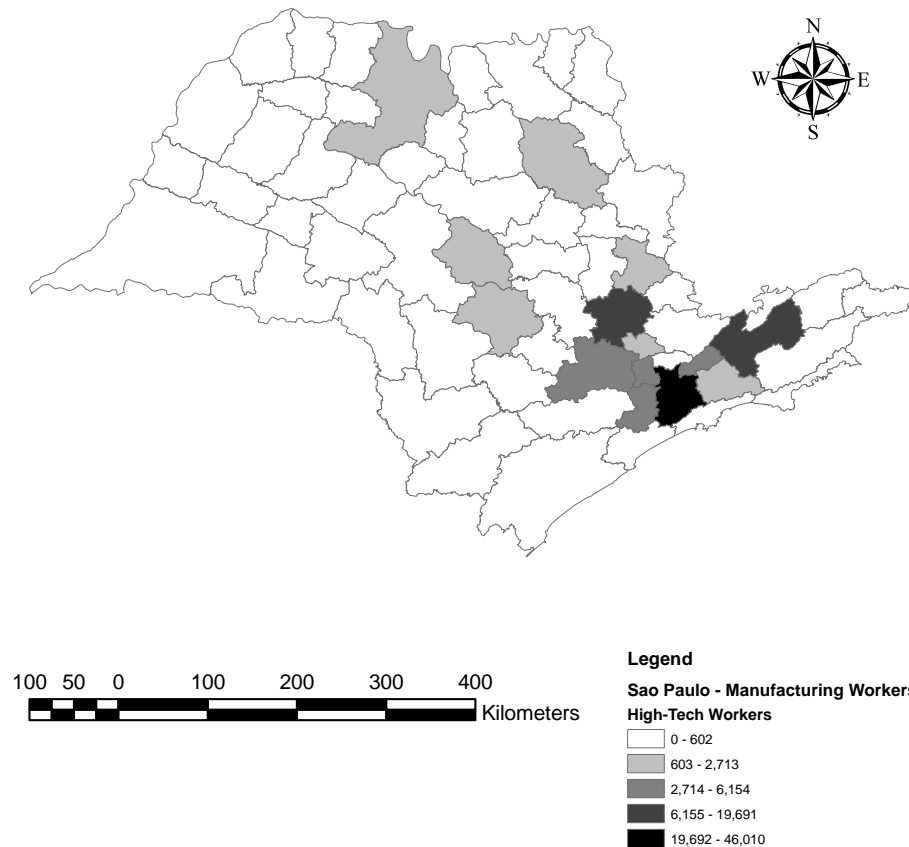
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2000
All manufacturing sectors**



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

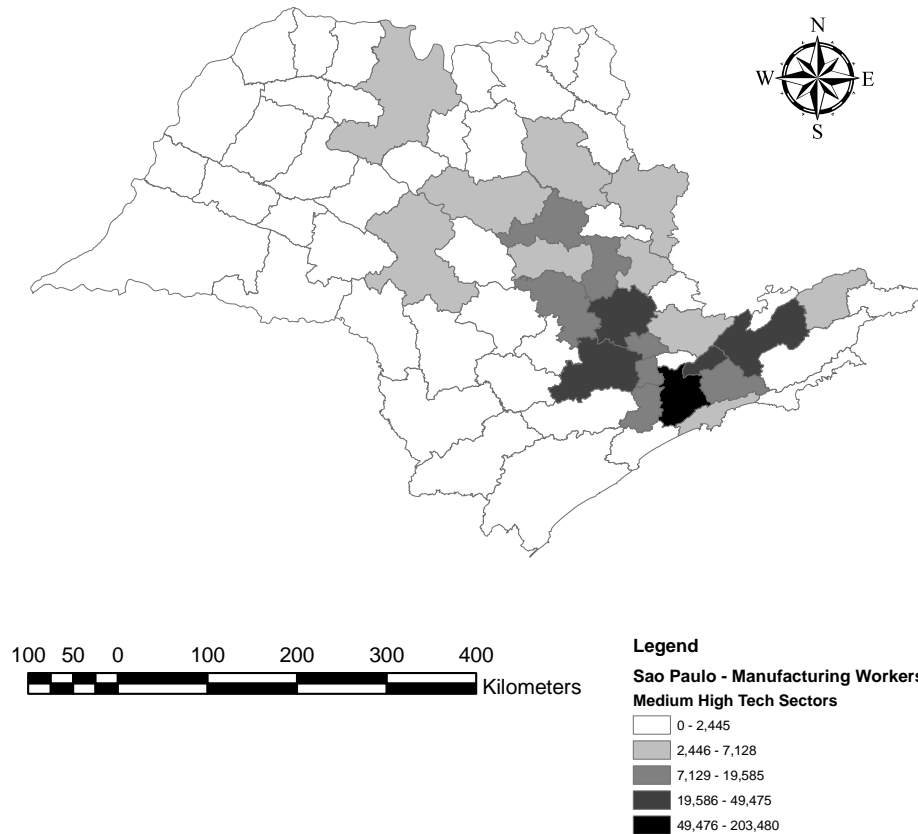
**Sao Paulo: regional distribution of
workers in manufacturing in 2000
High Tech Sectors (1)**



(1) High Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

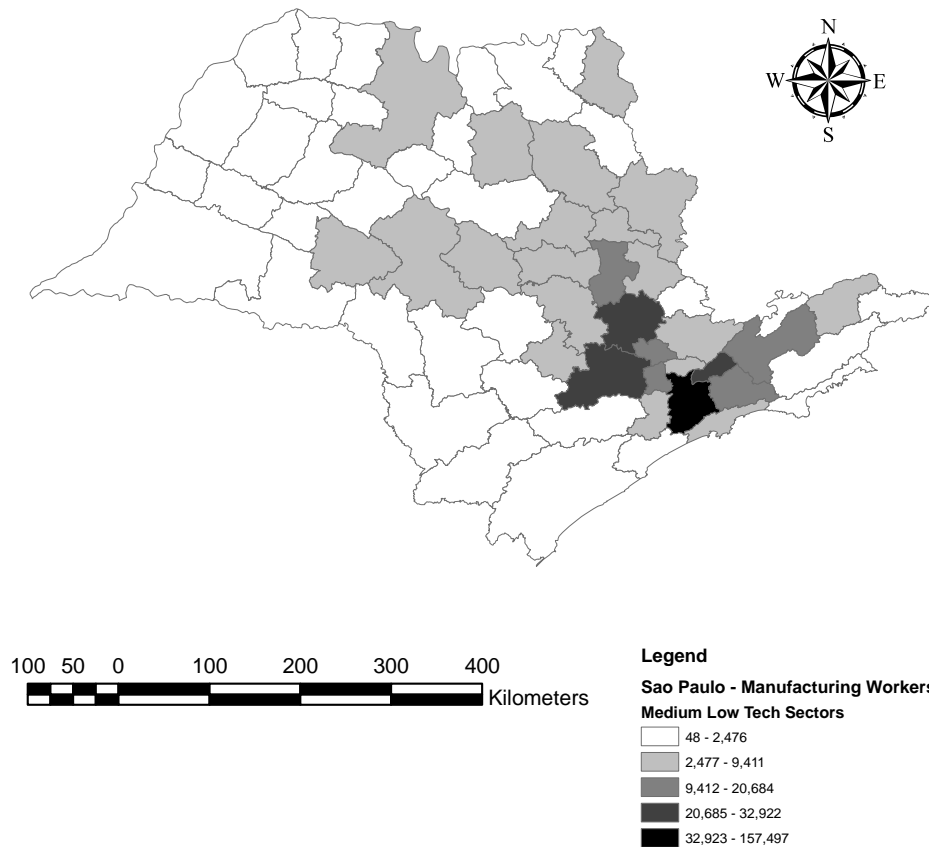
***Sao Paulo: regional distribution of
workers in manufacturing in 2000
Medium High Tech Sectors (1)***



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

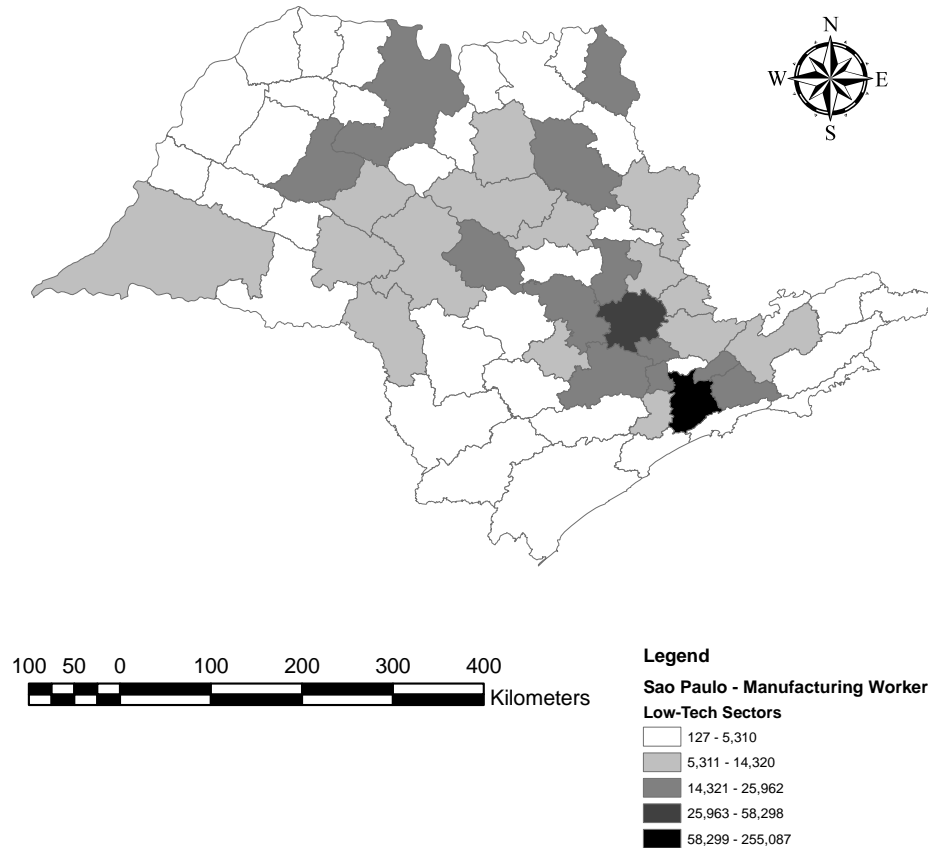
**Sao Paulo: regional distribution of
workers in manufacturing in 2000
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

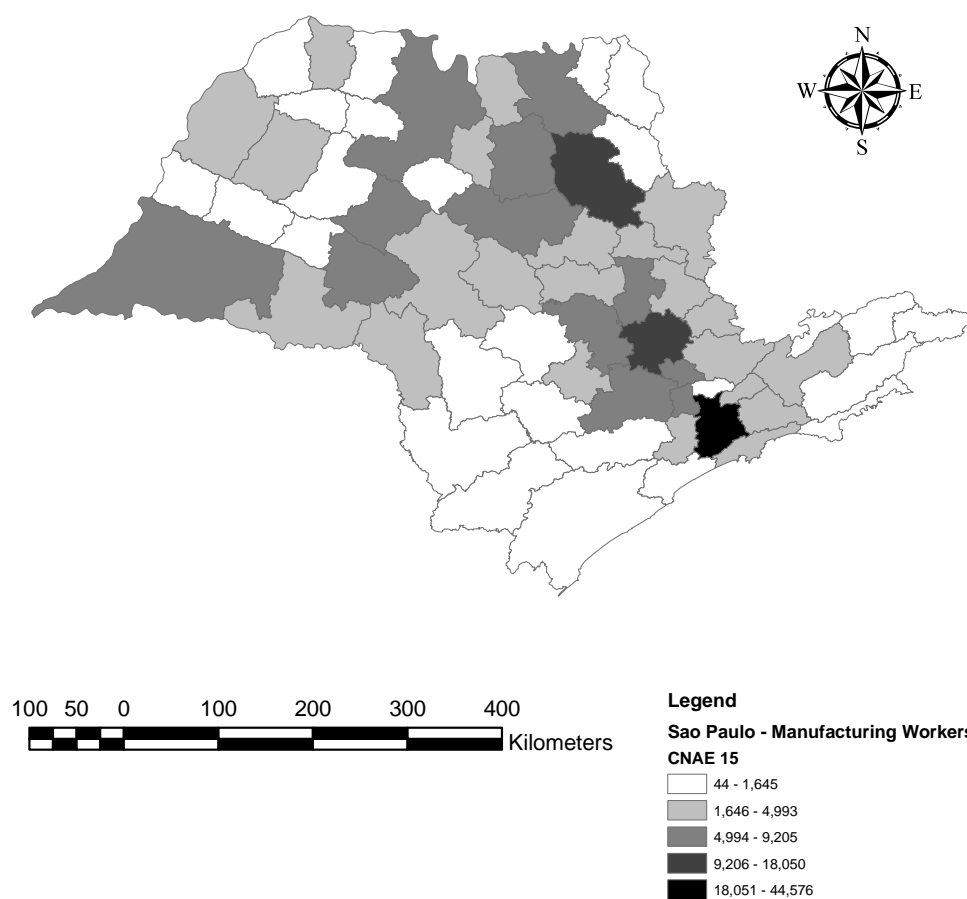
**Sao Paulo: regional distribution of
workers in manufacturing in 2000
Low-Tech Sectors (1)**



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

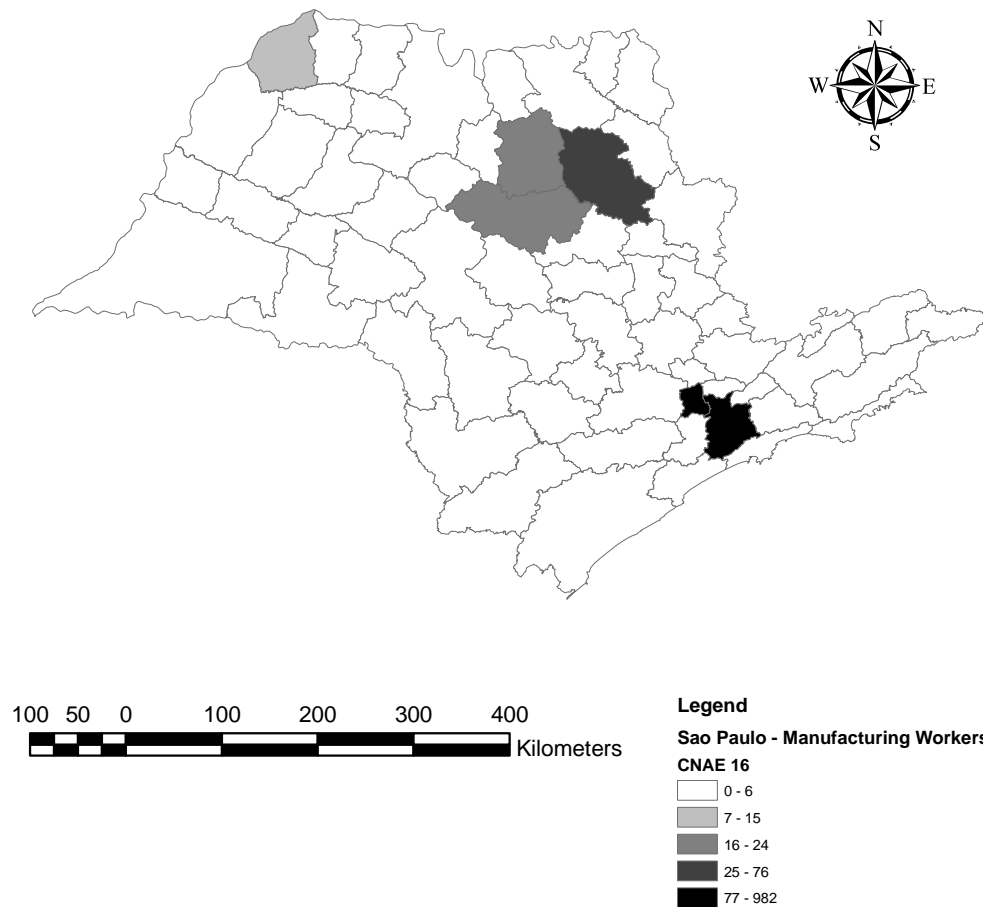
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



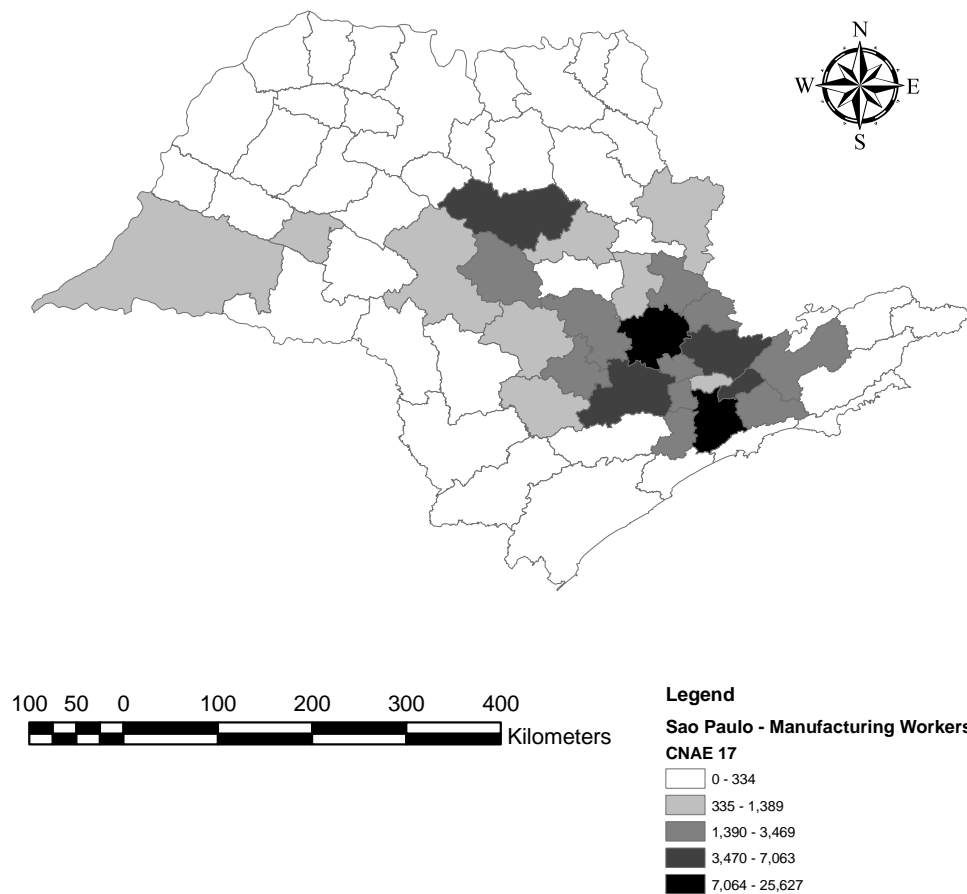
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 16
(Manufacture of tobacco products)**



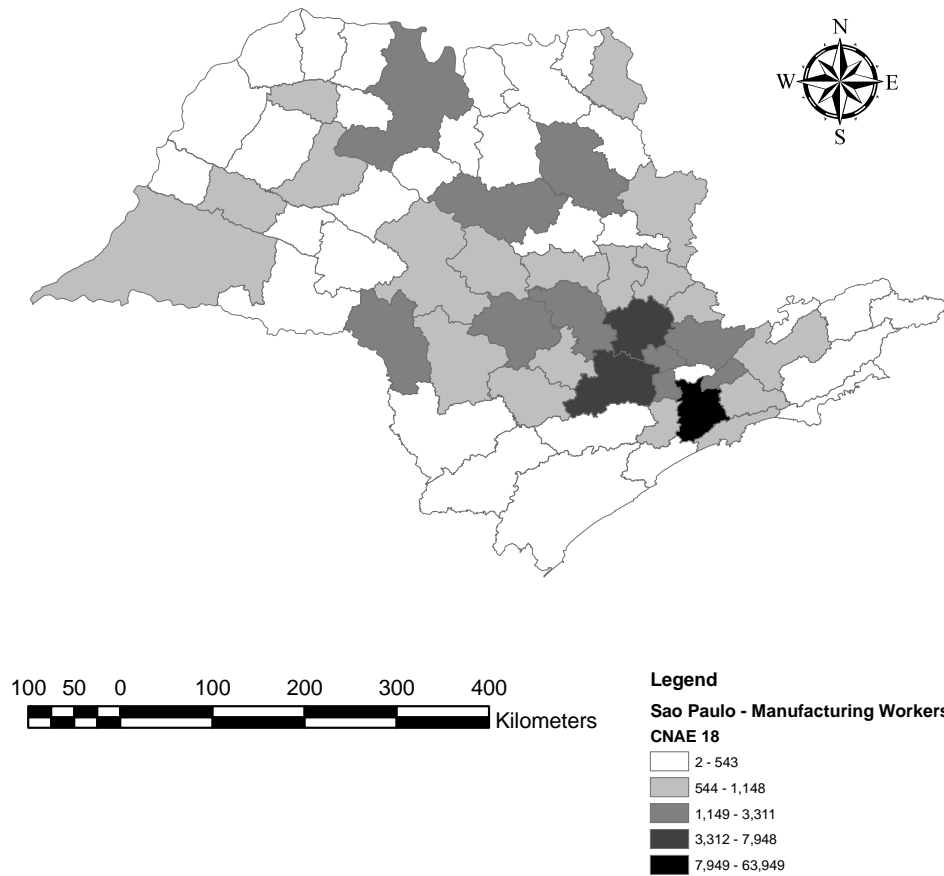
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



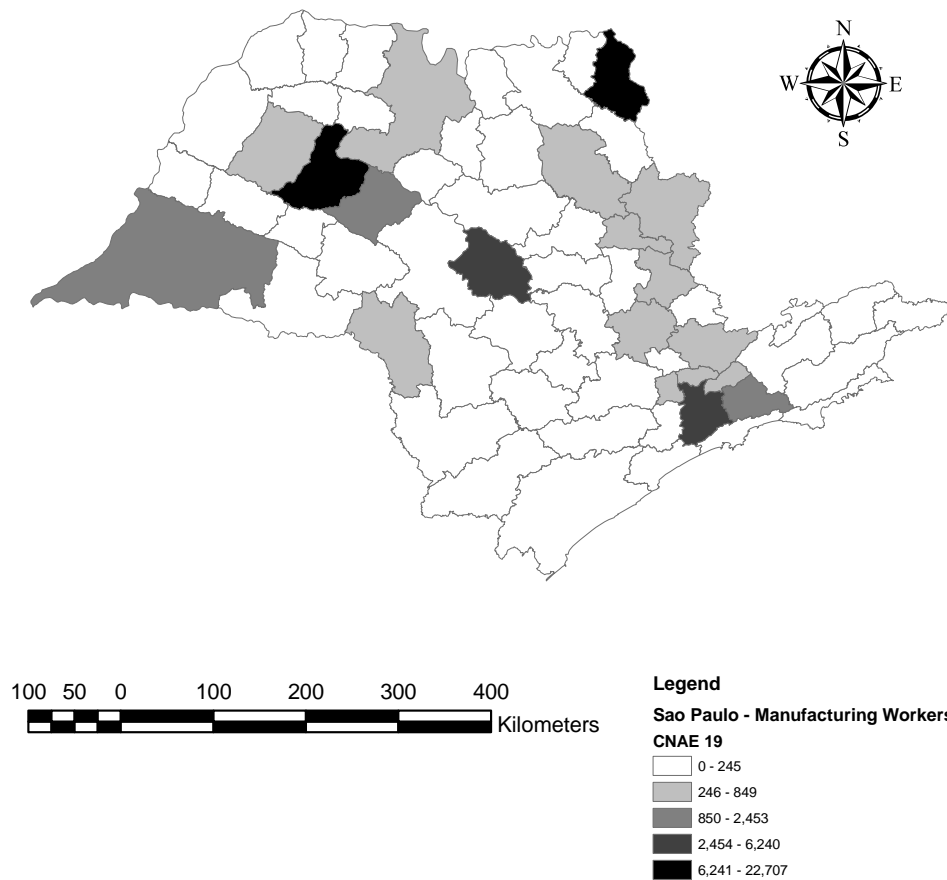
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)***



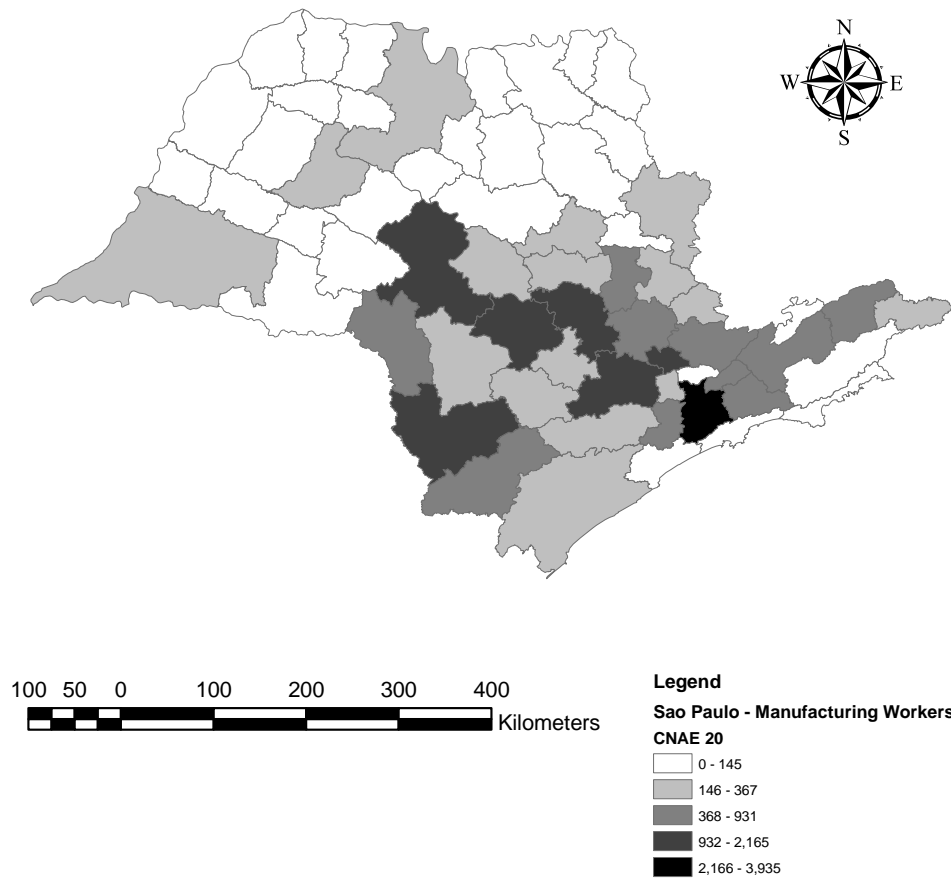
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



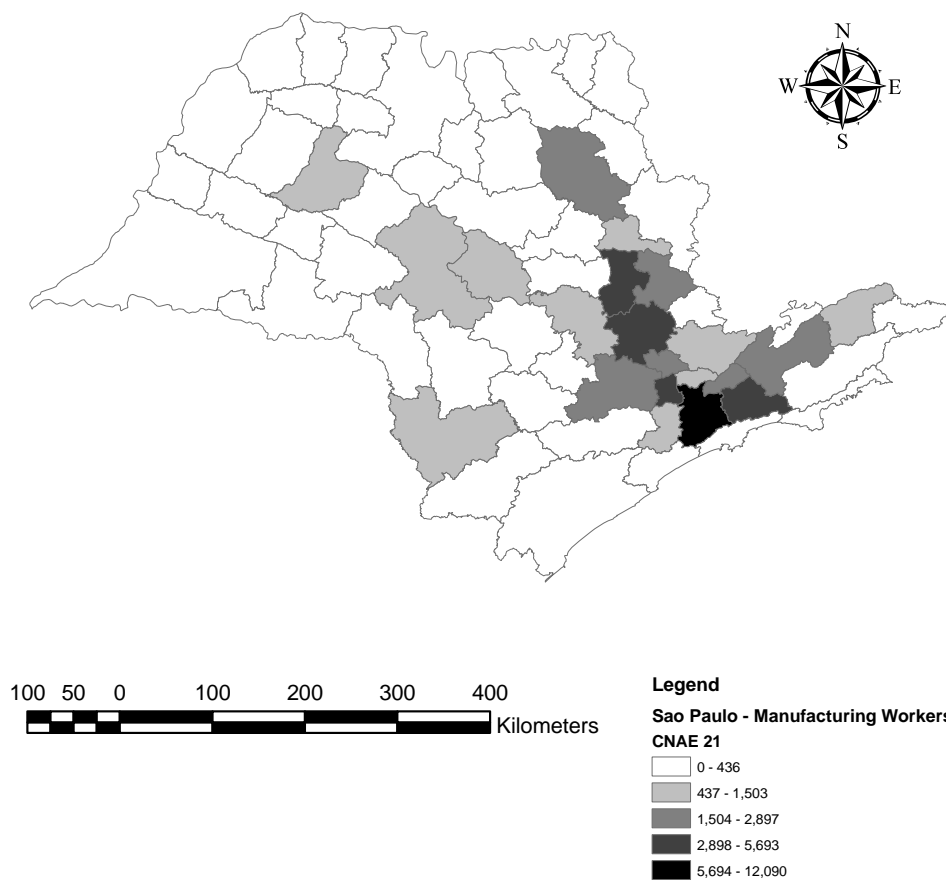
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



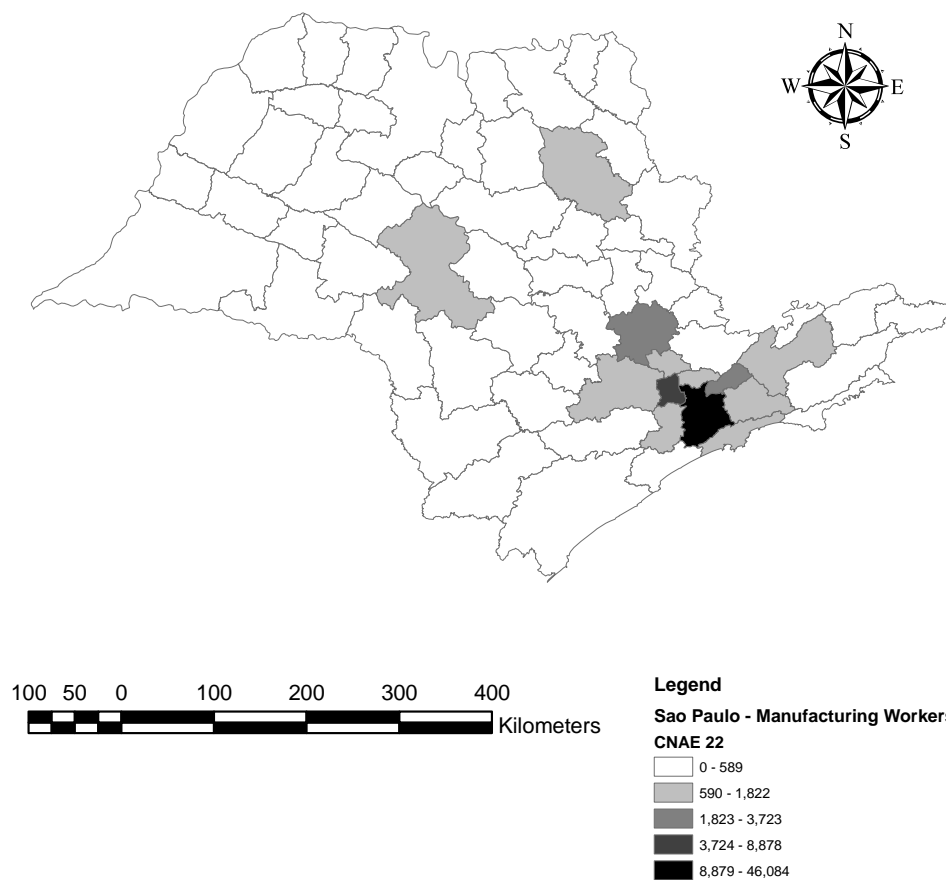
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



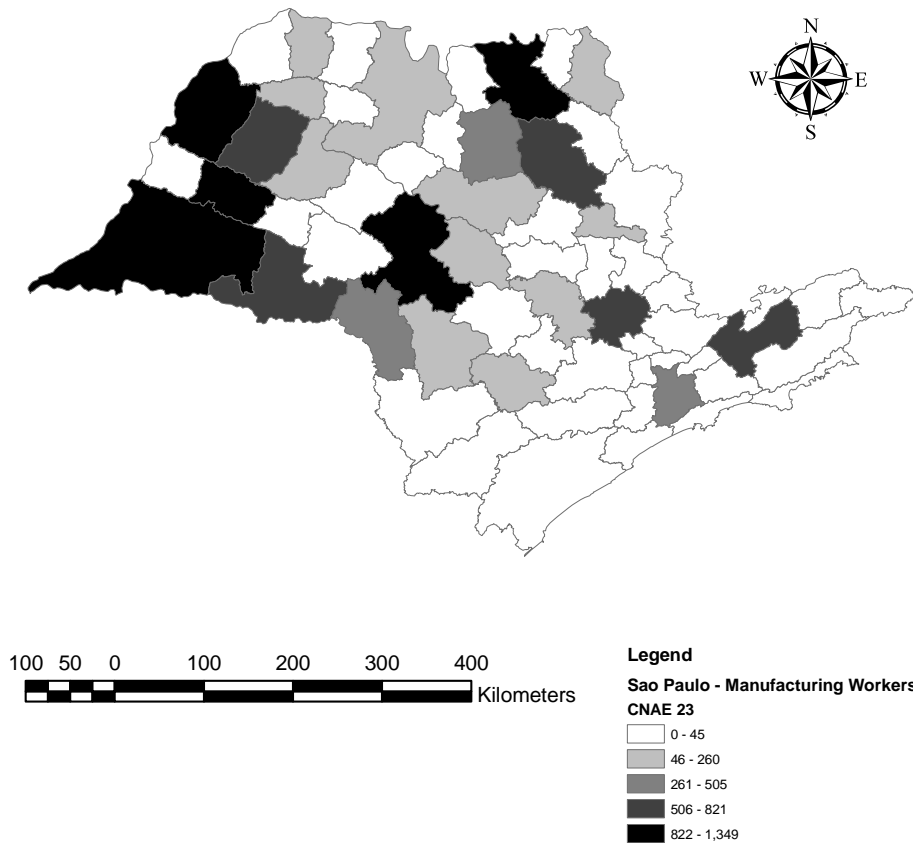
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



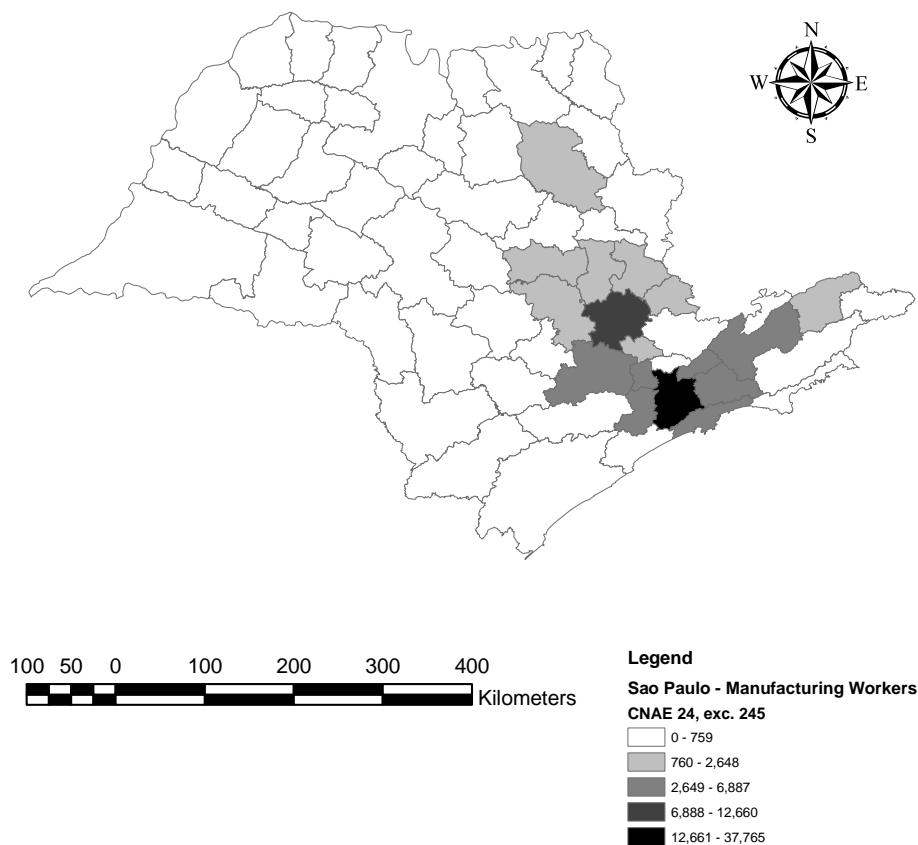
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)**



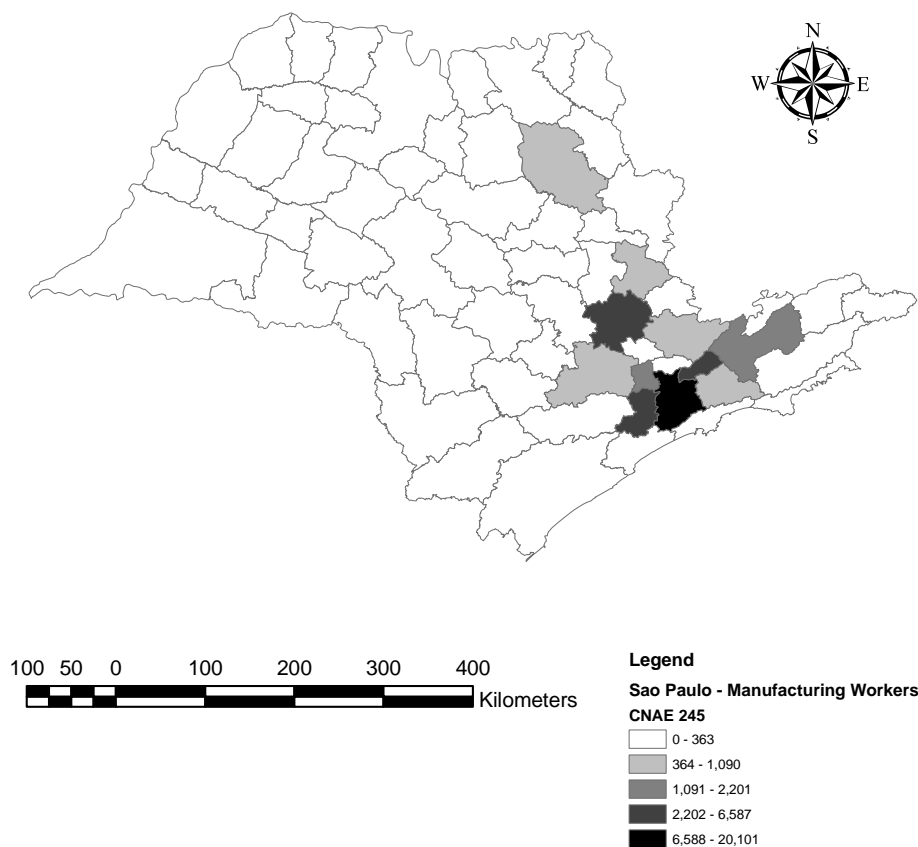
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 24, exc.
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



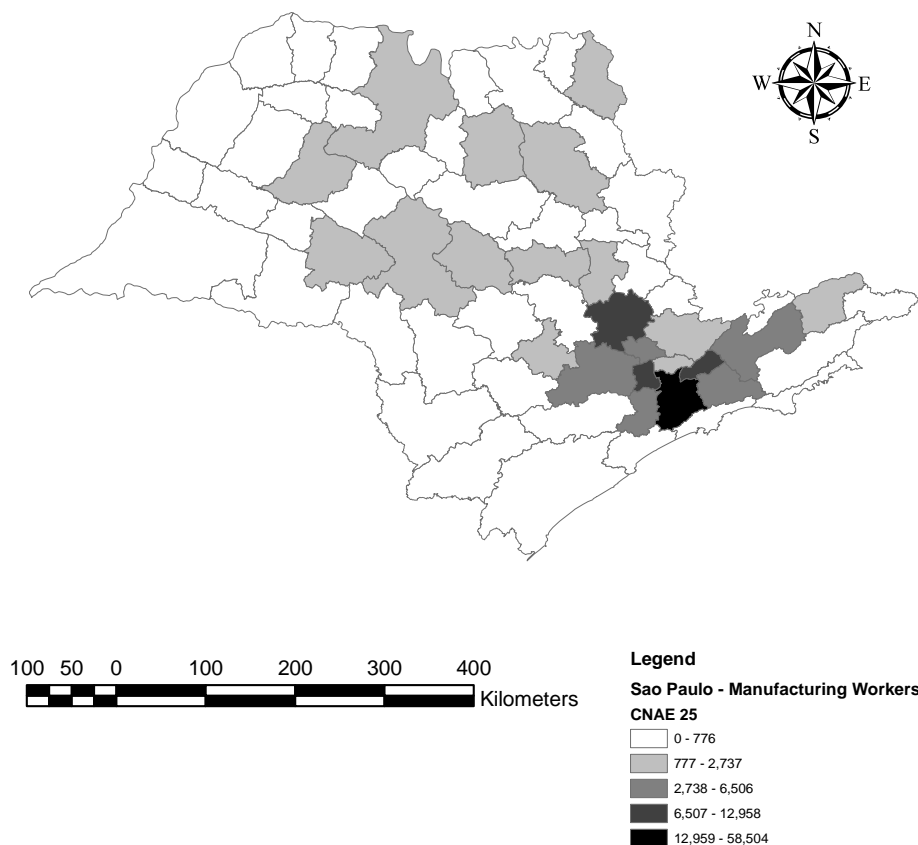
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



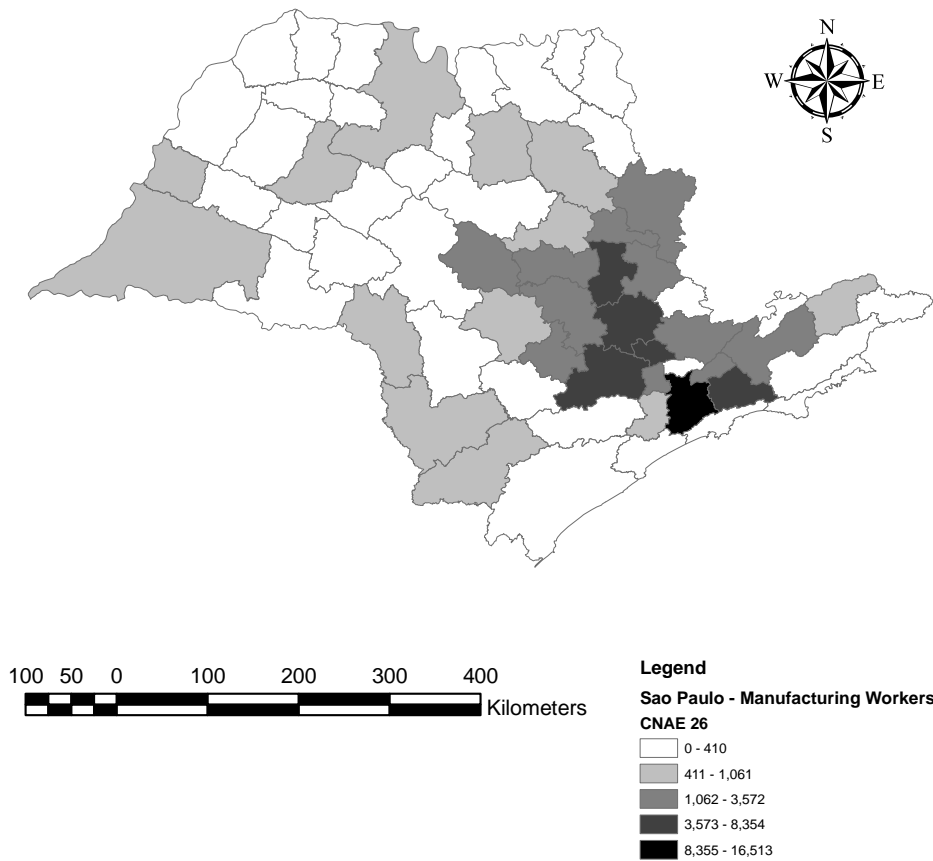
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



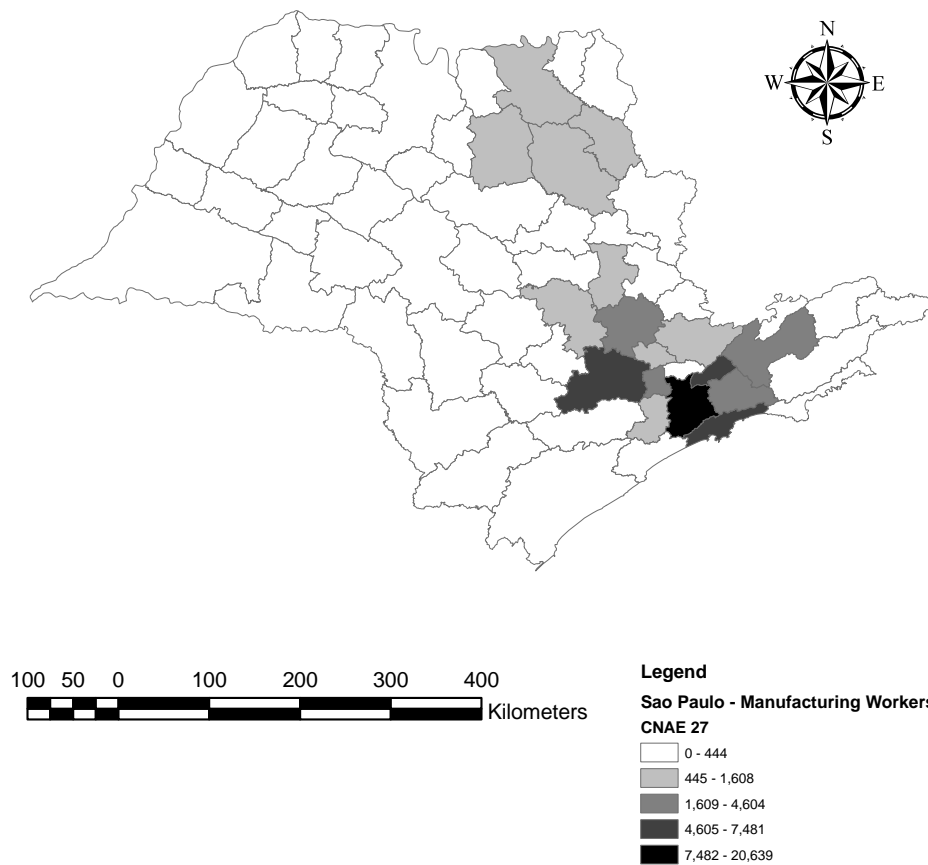
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



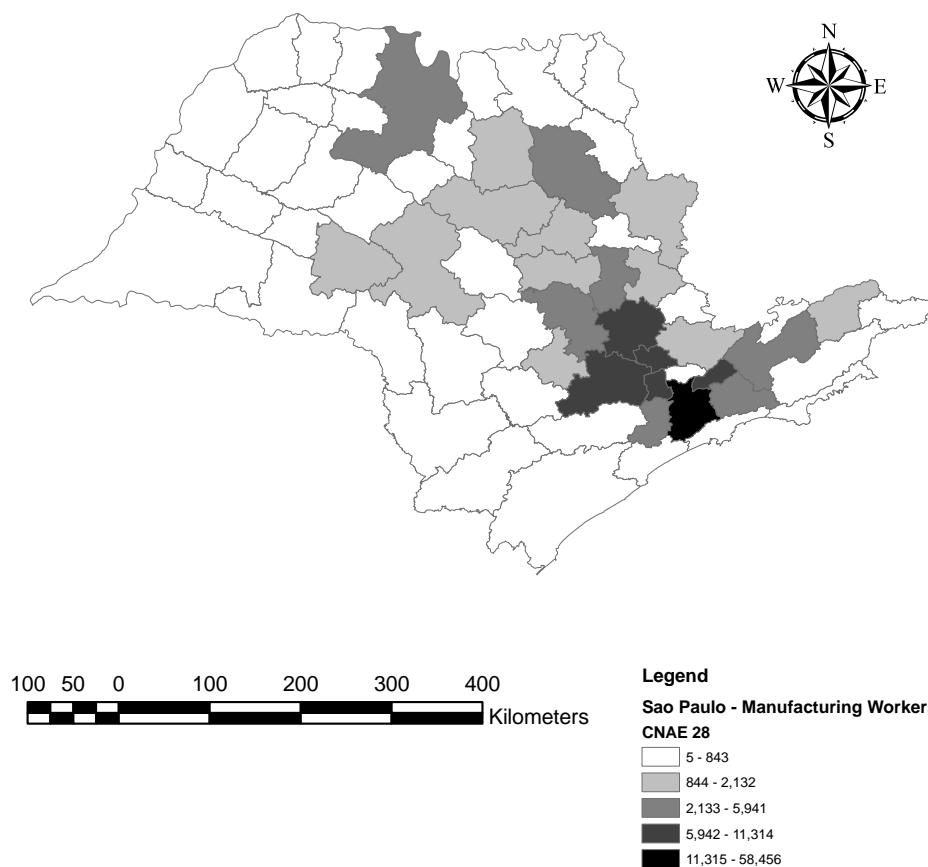
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



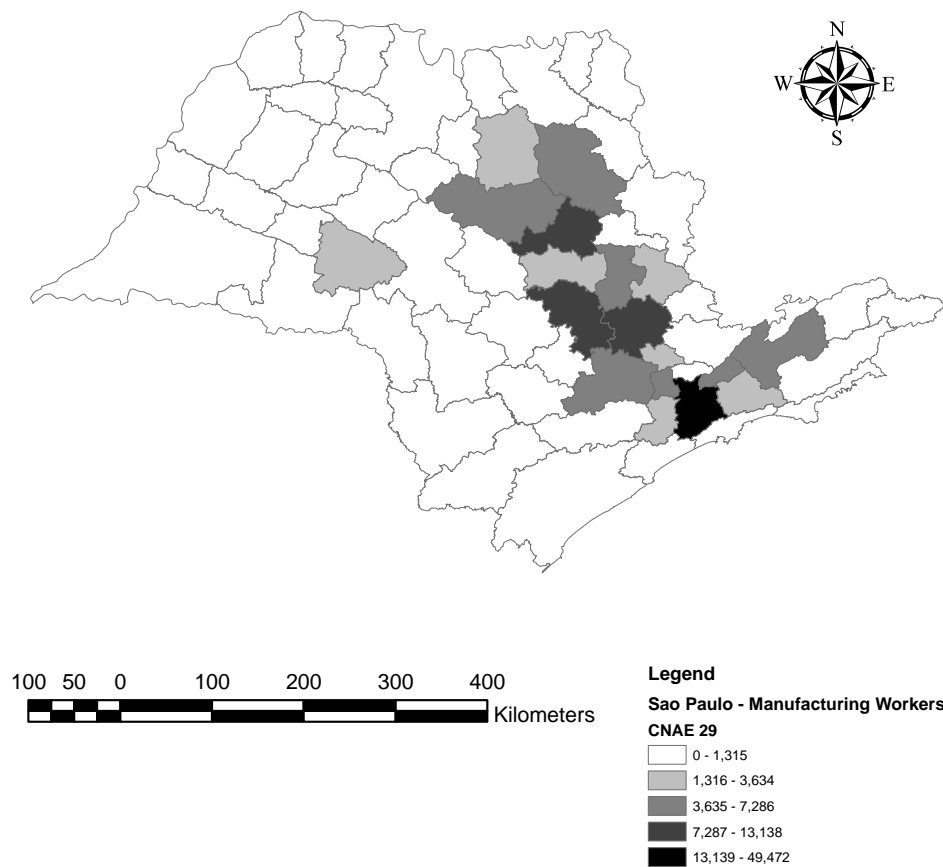
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



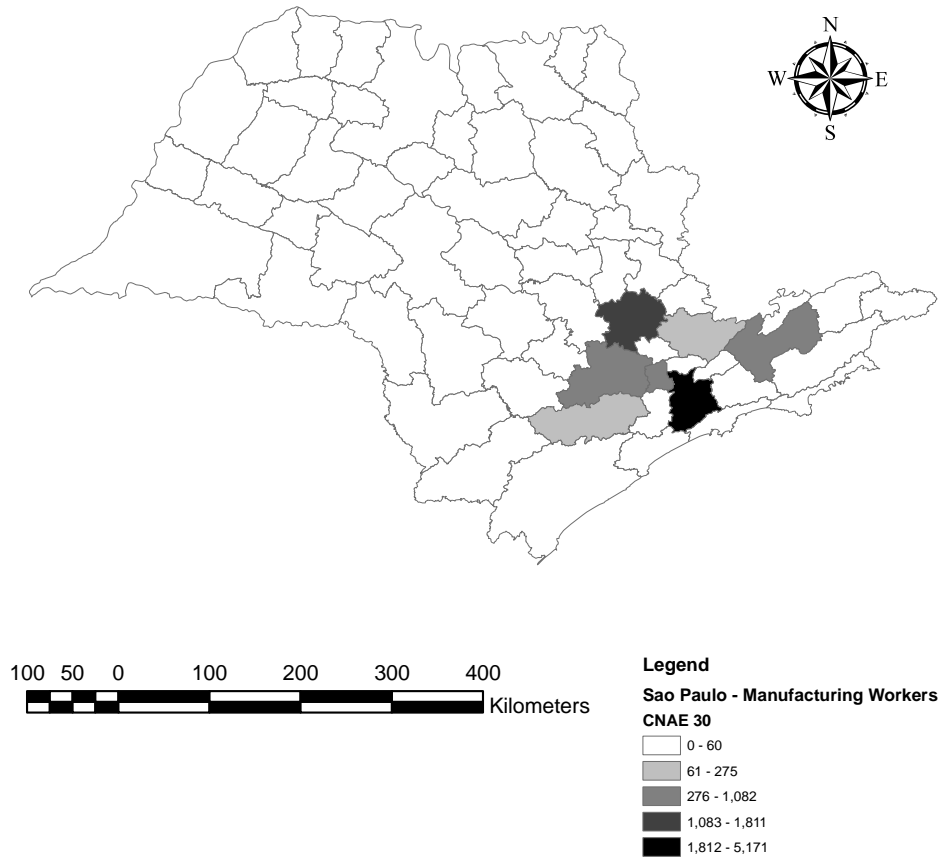
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



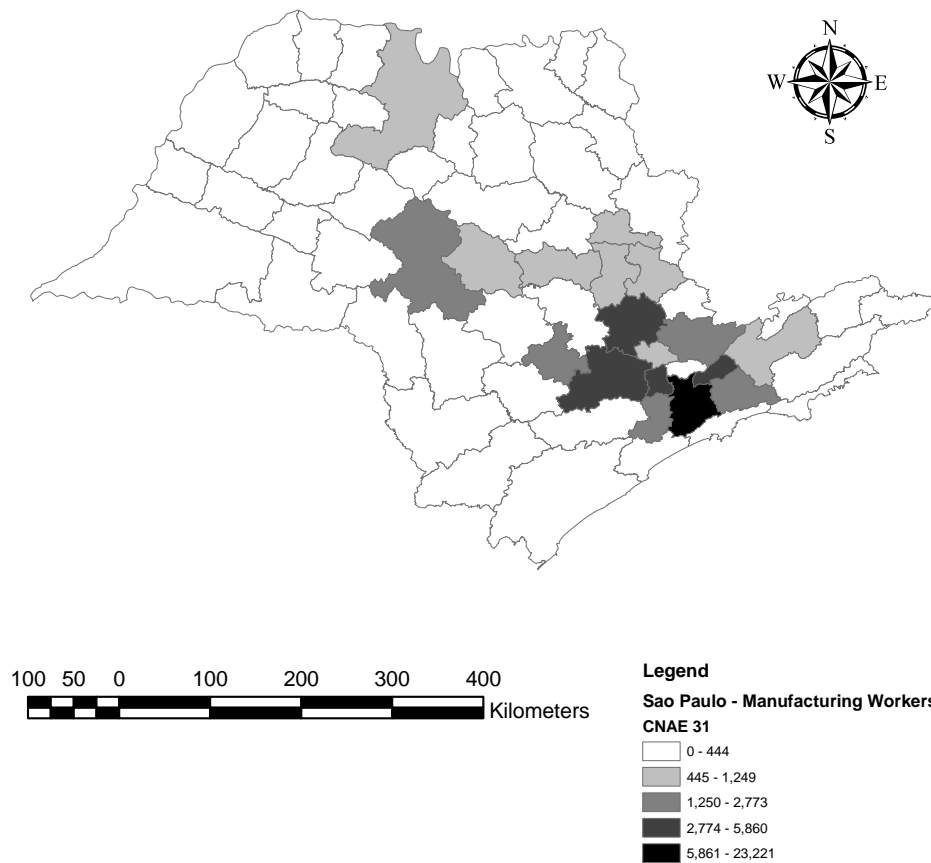
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting and
computing machinery)**



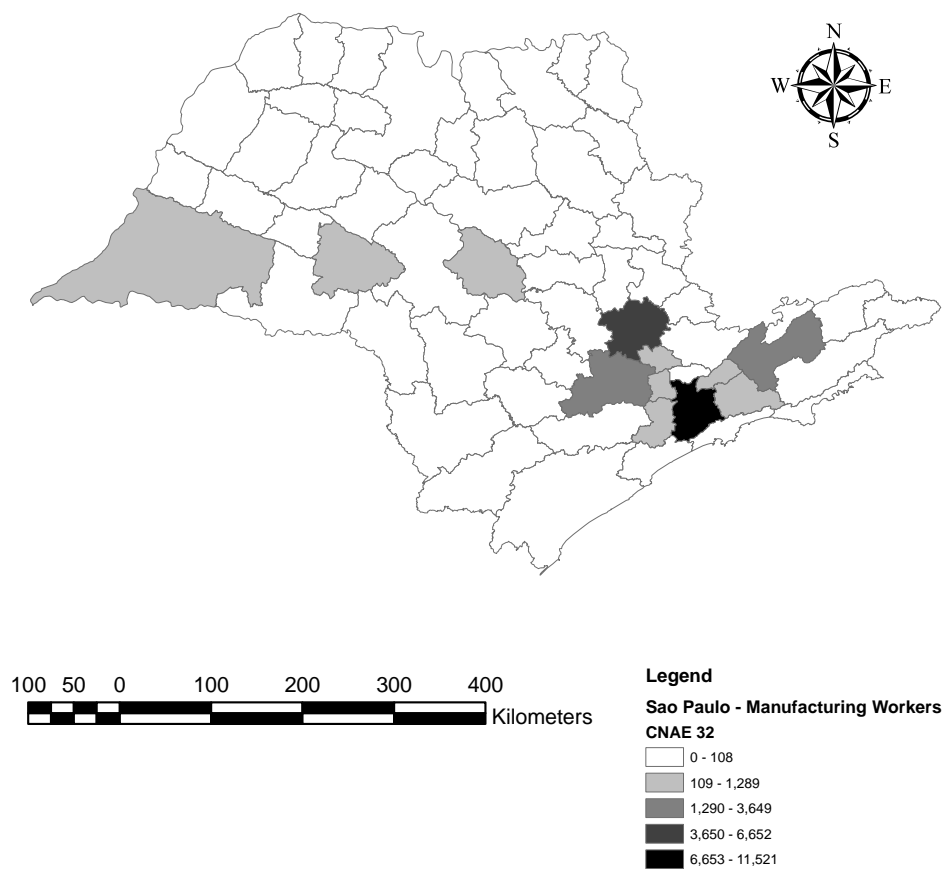
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c)**



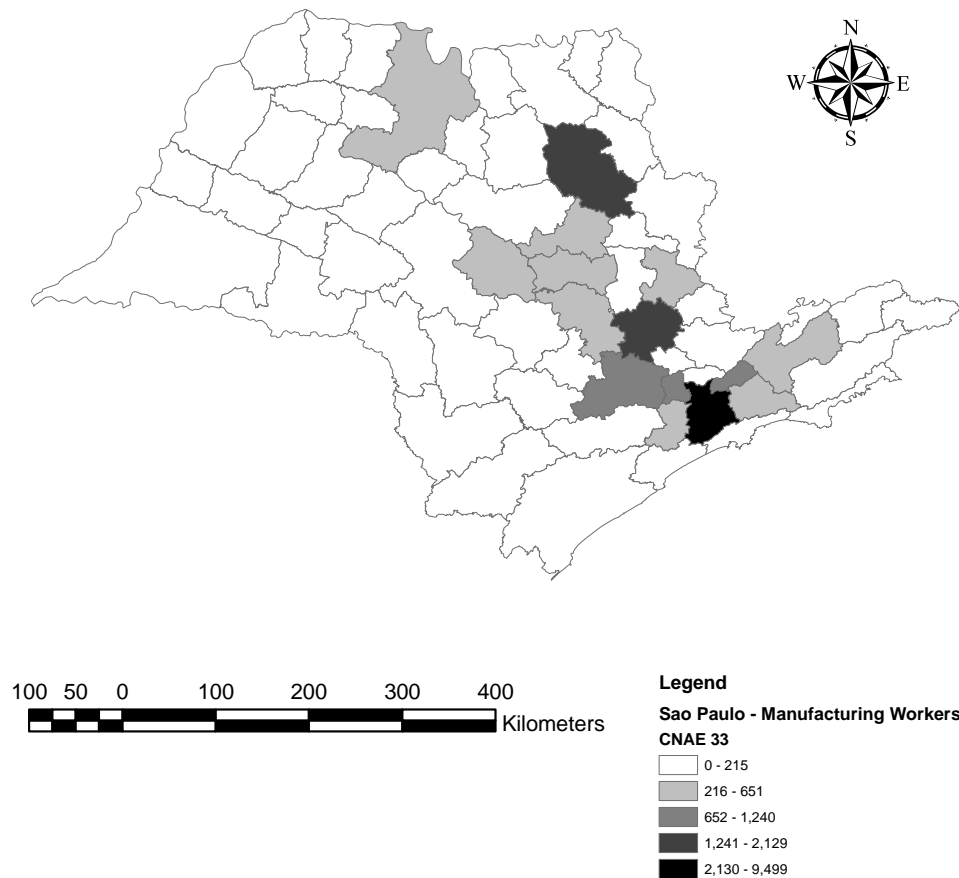
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

***Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and
communication equipment and apparatus)***



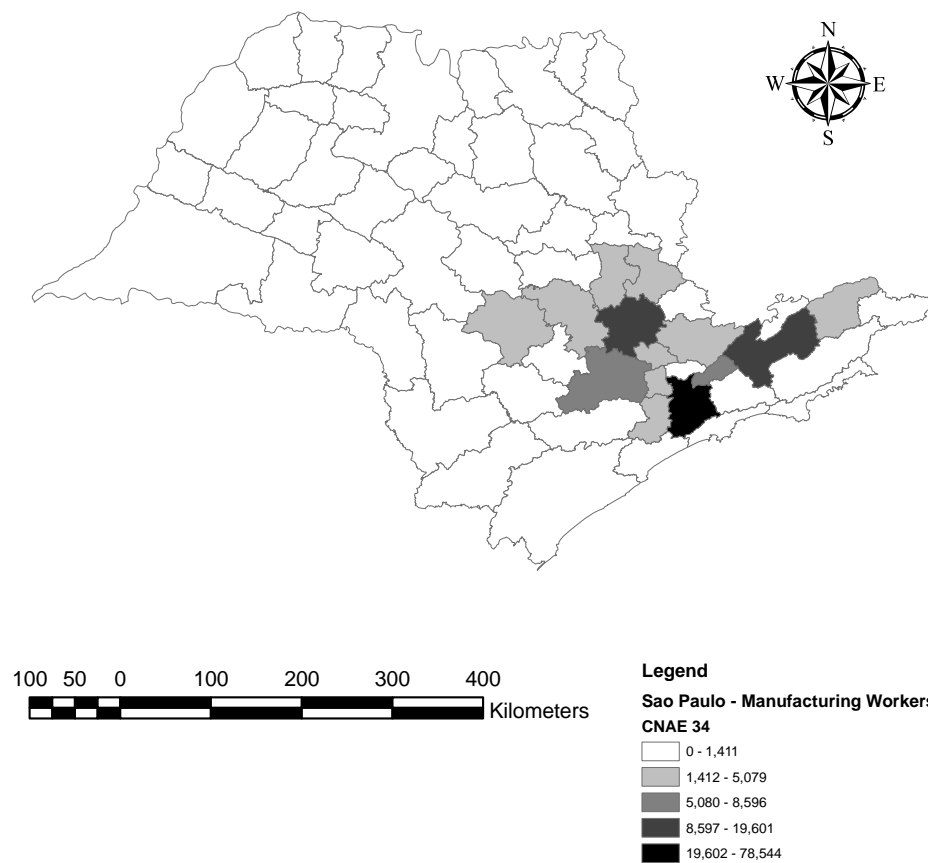
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)**



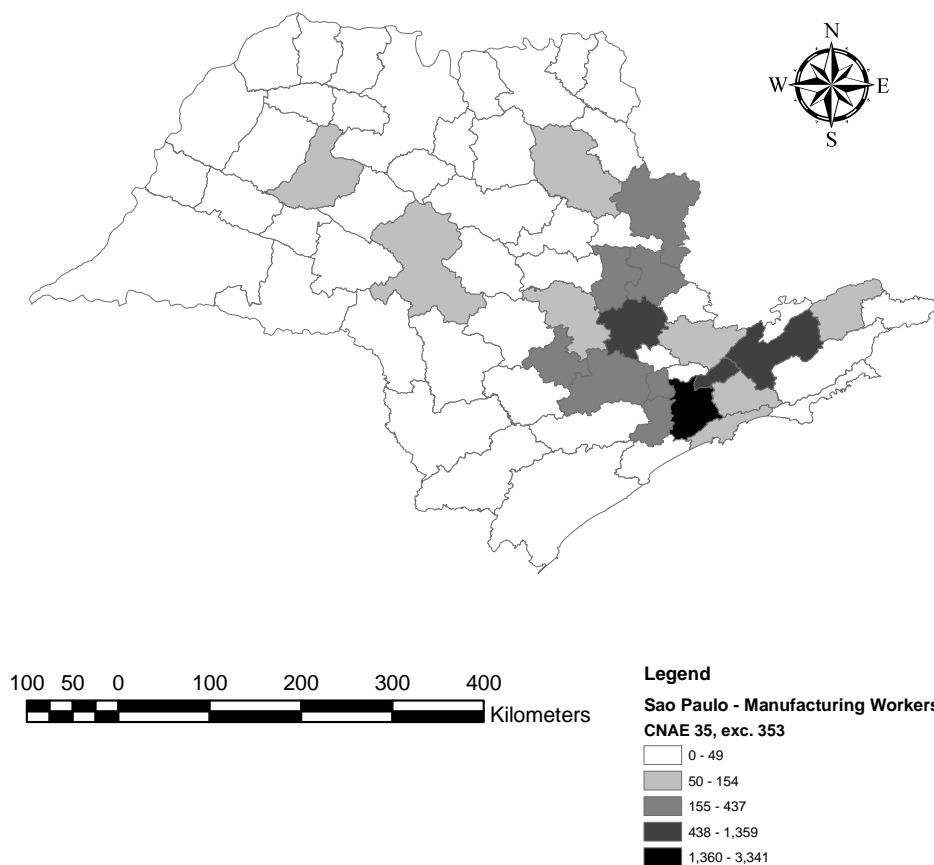
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



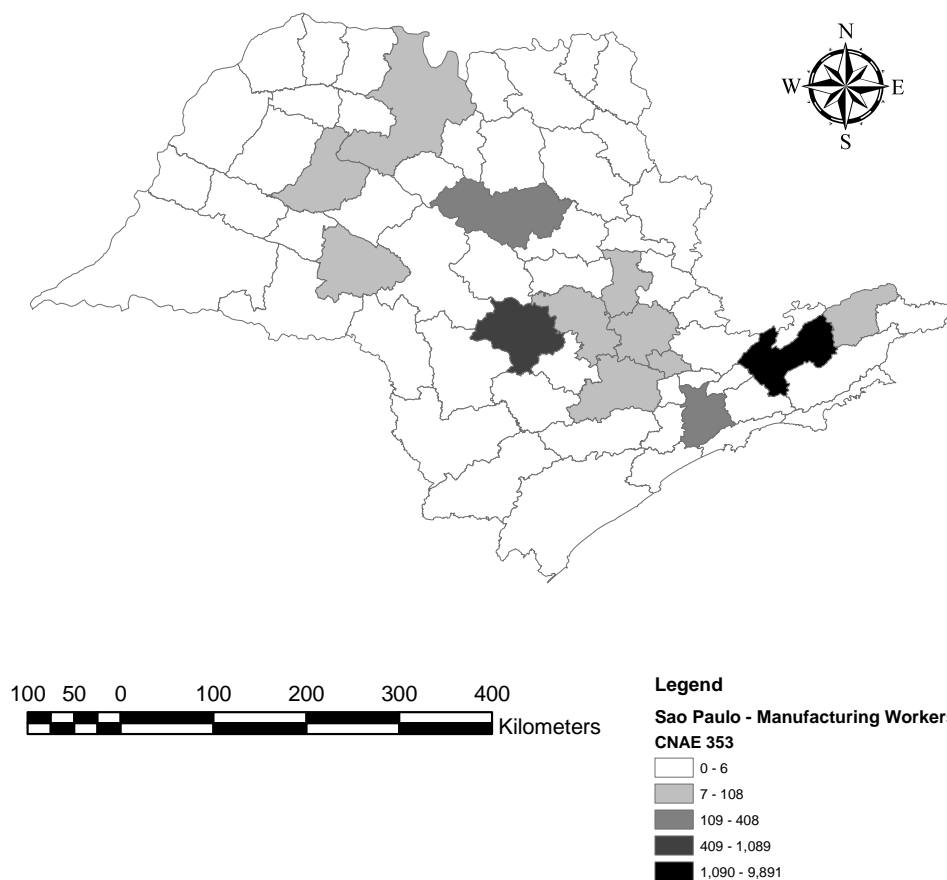
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



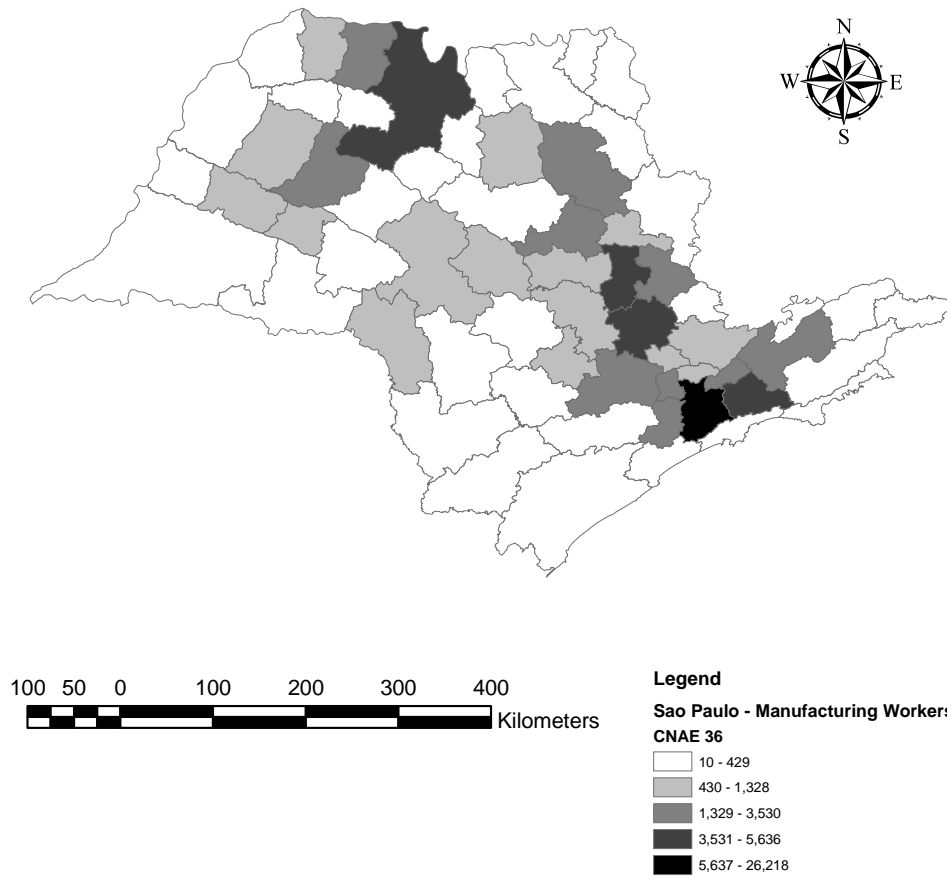
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



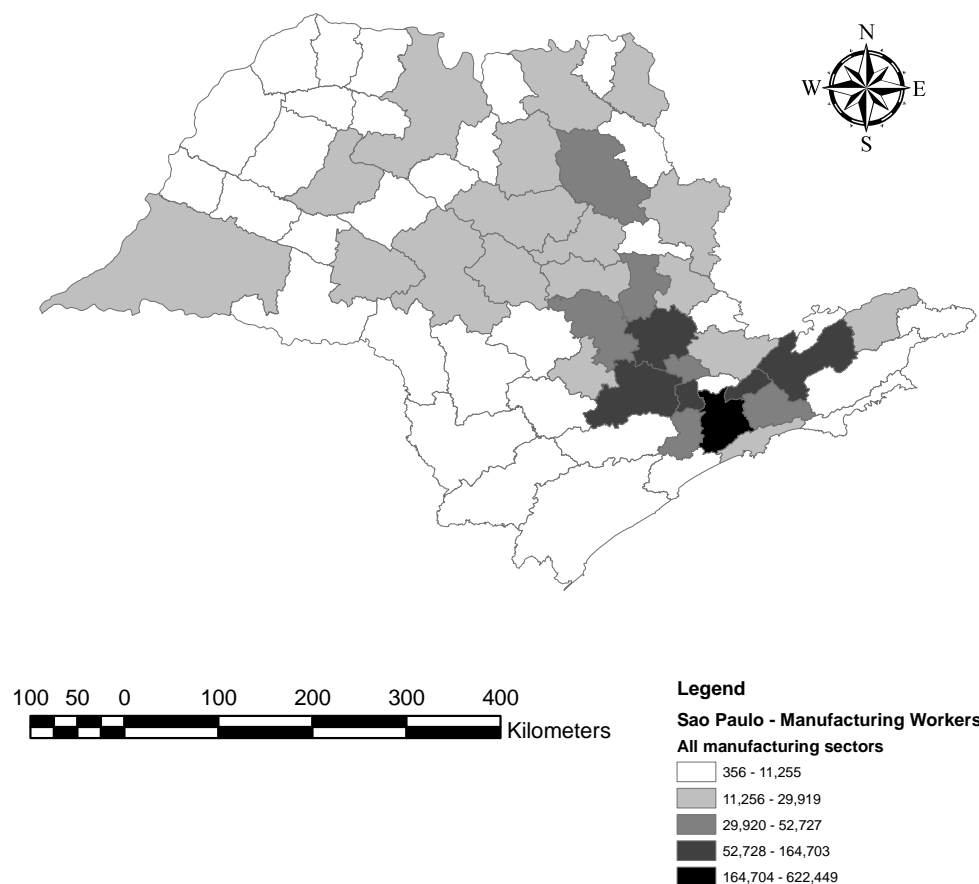
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



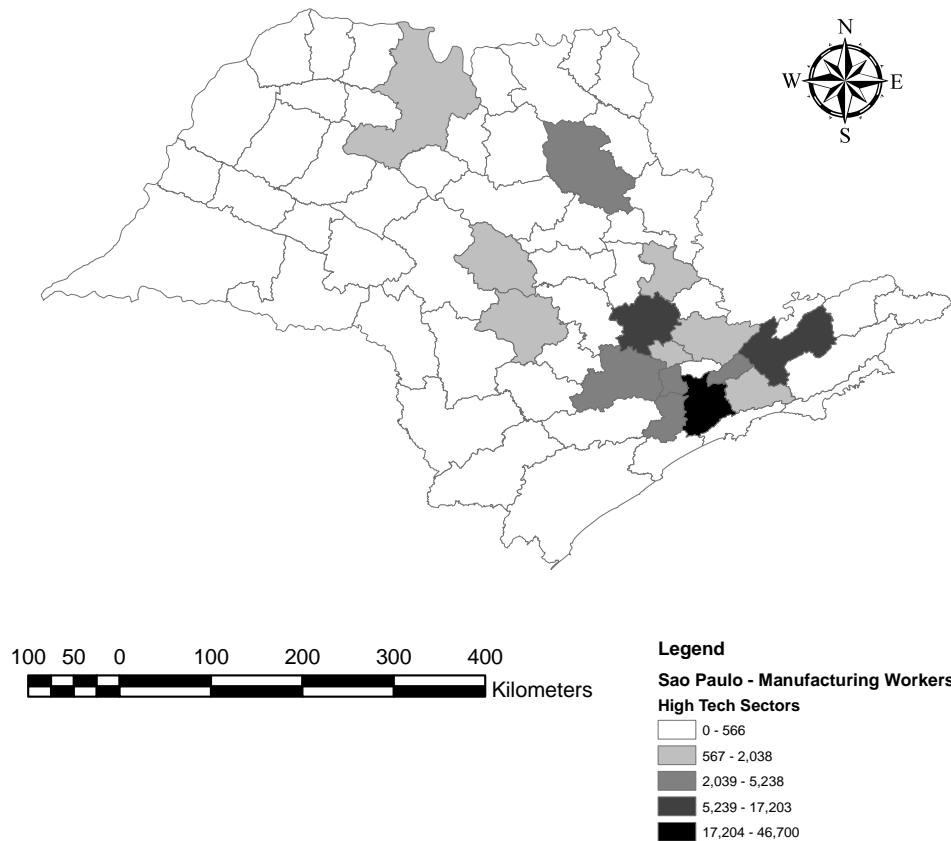
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2003
All manufacturing sectors***



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

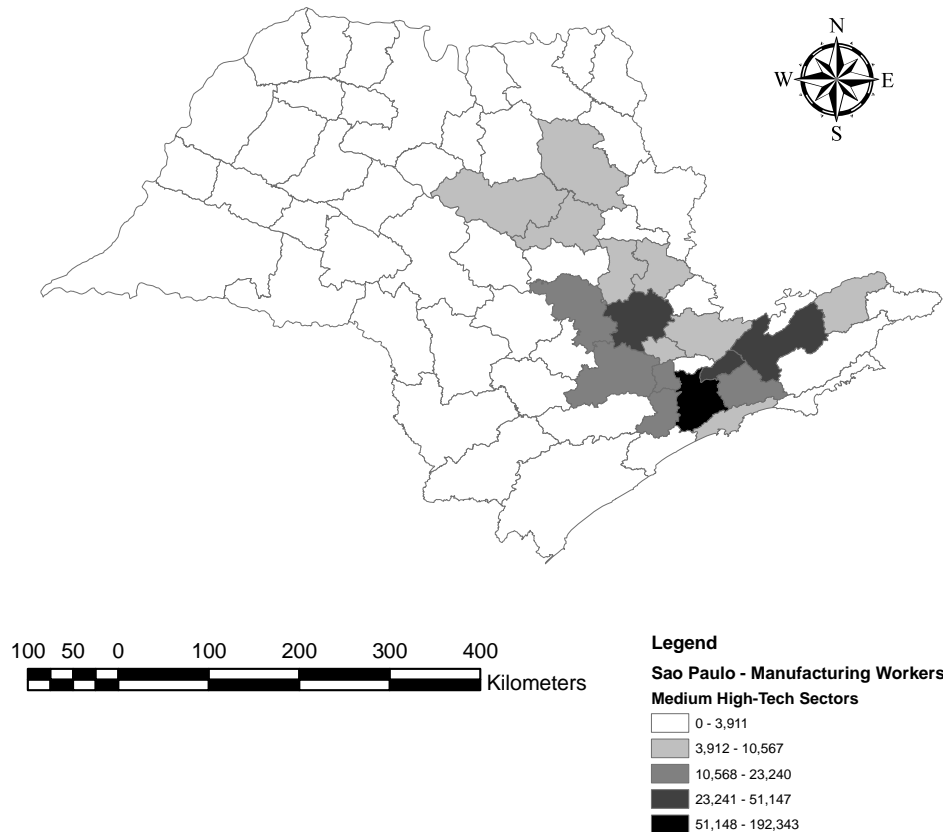
**Sao Paulo: regional distribution of
workers in manufacturing in 2003
High Tech Sectors (1)**



(1) High Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

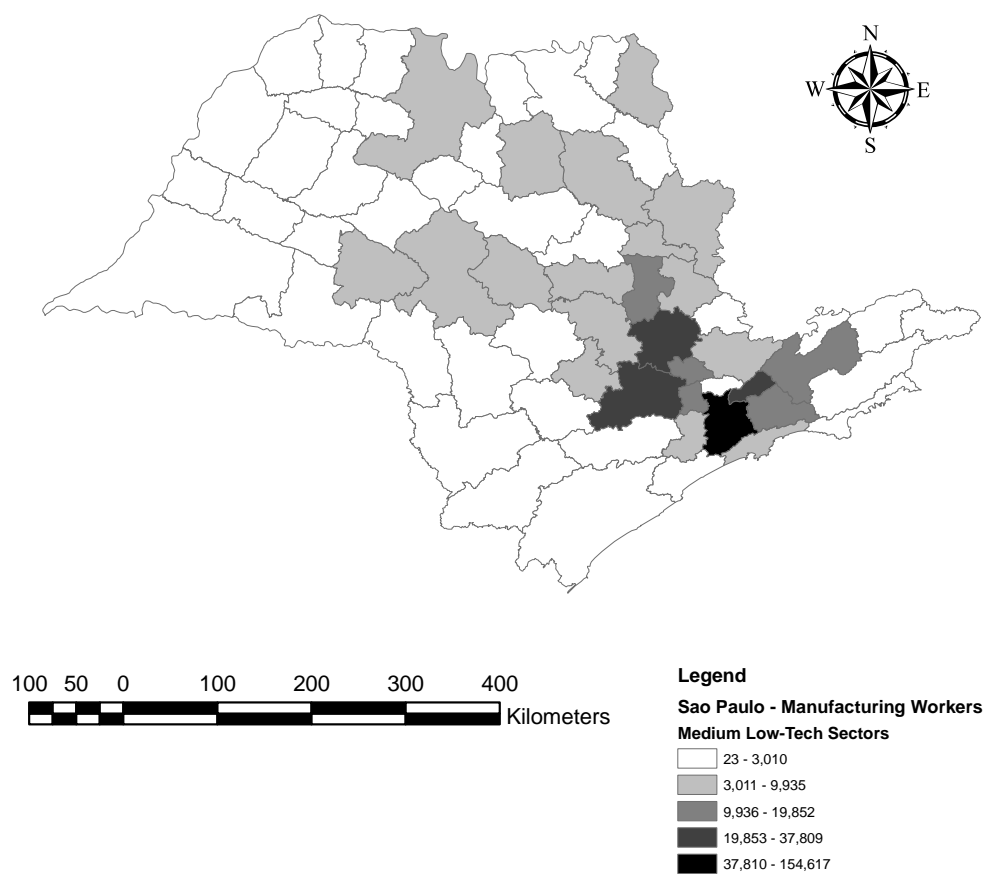
**Sao Paulo: regional distribution of
workers in manufacturing in 2003
Medium High-Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

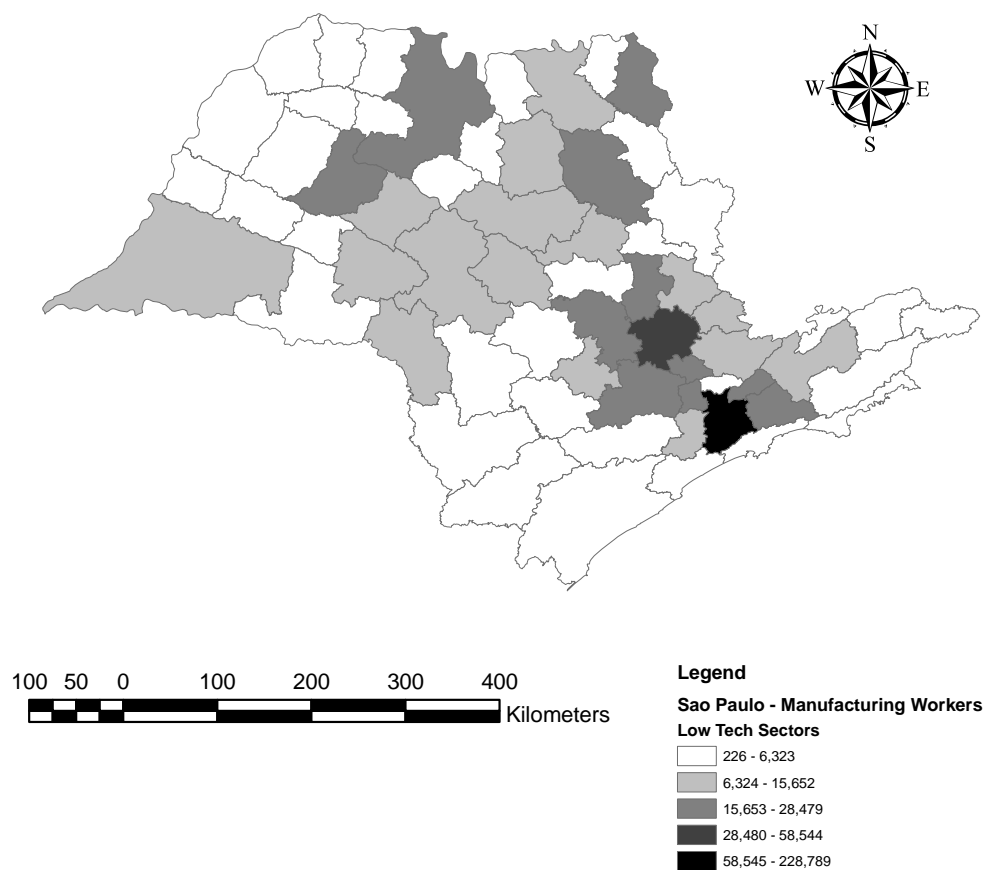
**Sao Paulo: regional distribution of
workers in manufacturing in 2003
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products;Coke, refined petroleum products and nuclear fuel;Other non-metallic and mineral products;Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

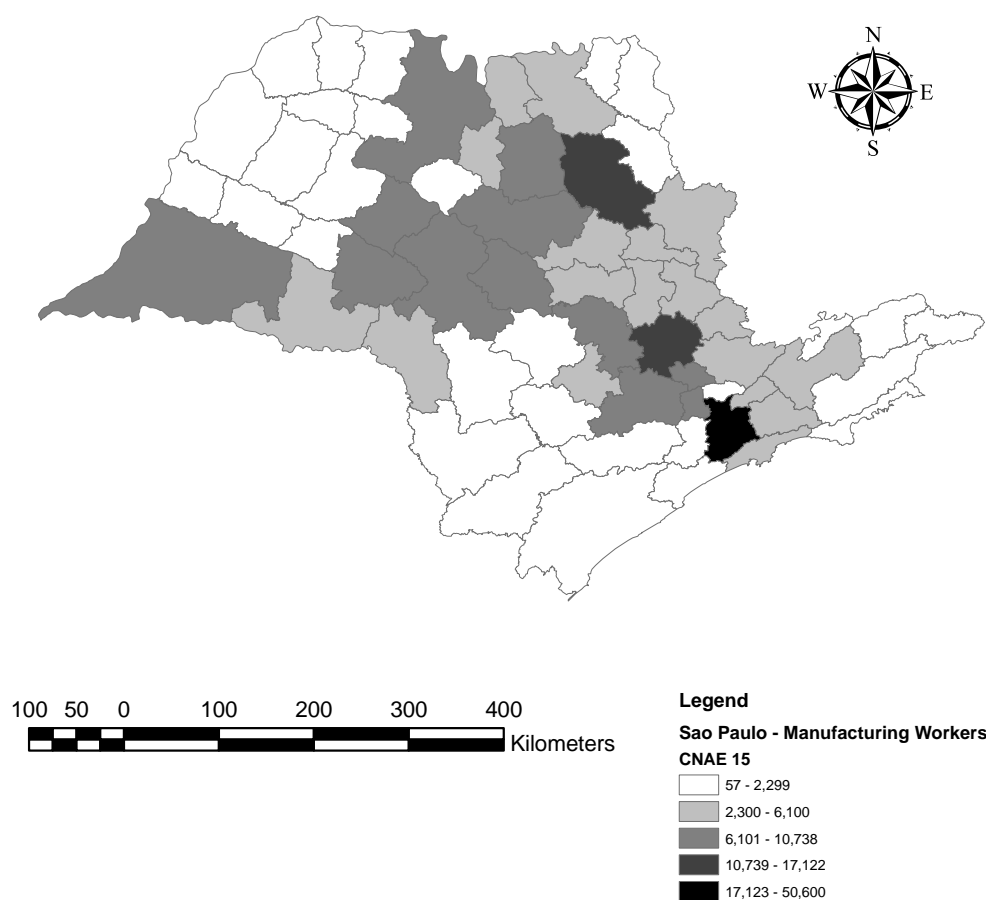
Sao Paulo: regional distribution of workers in manufacturing in 2003 Low-Tech Sectors (1)



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

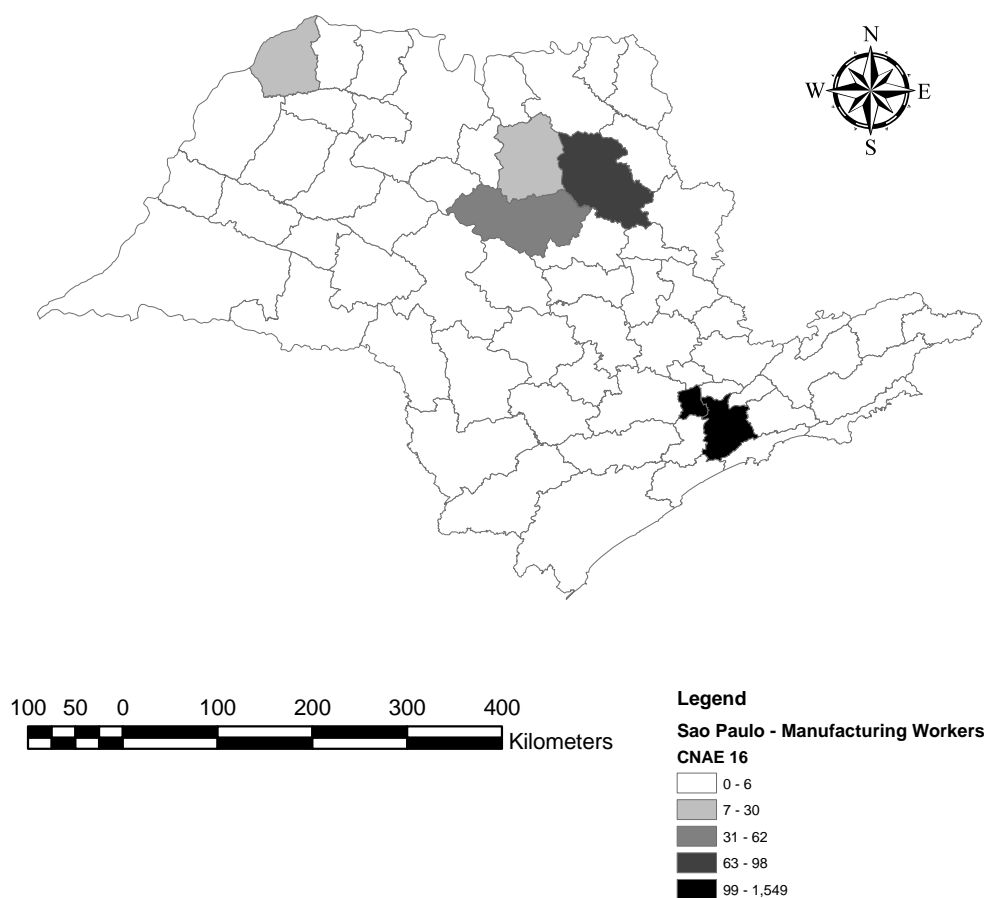
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



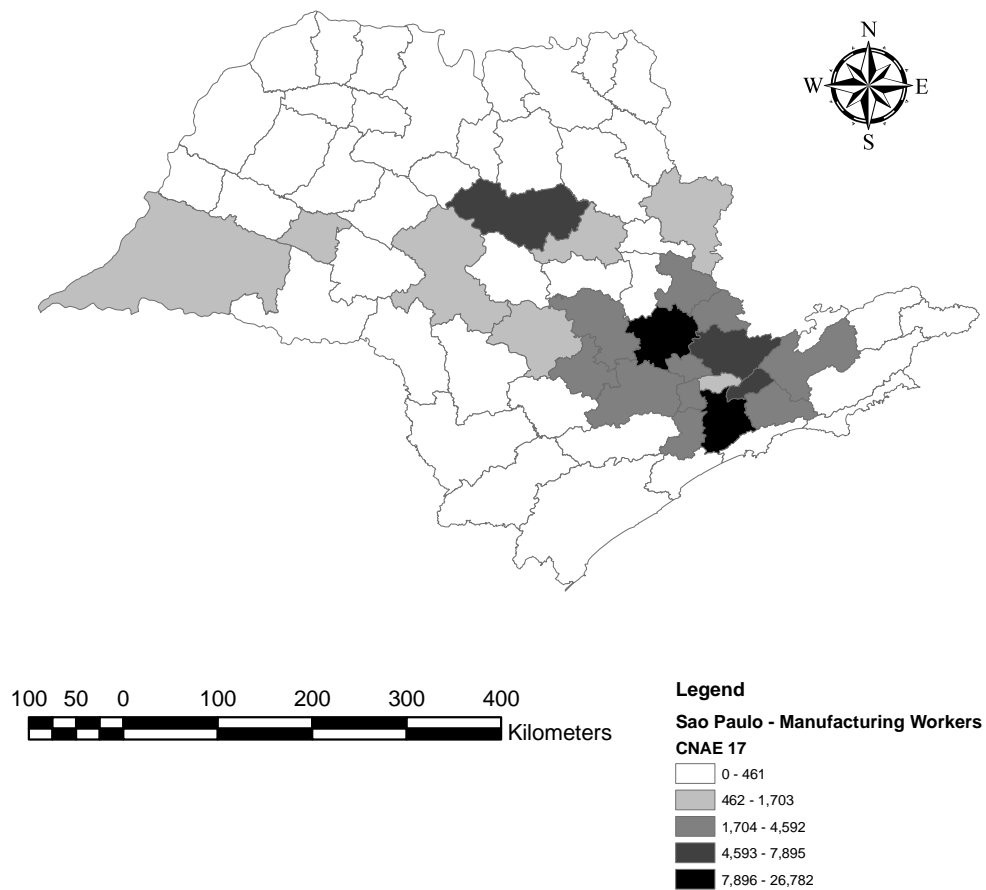
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 16
(Manufacture of tobacco products)**



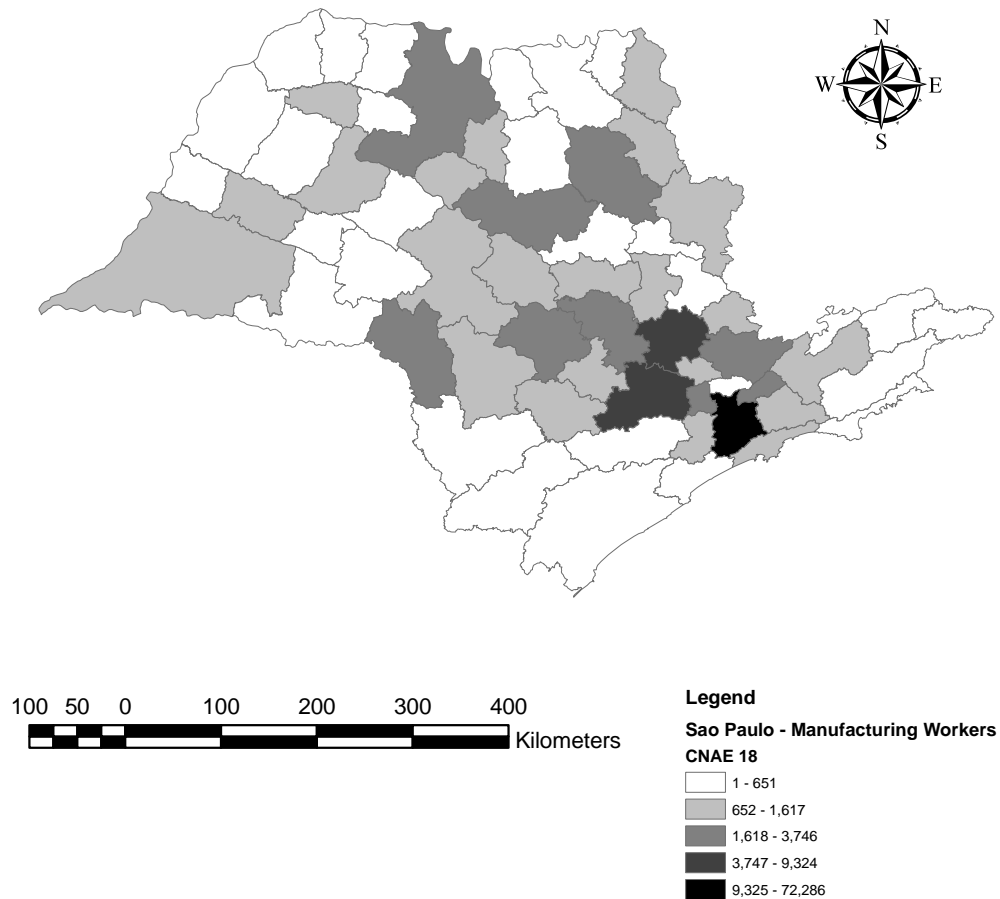
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



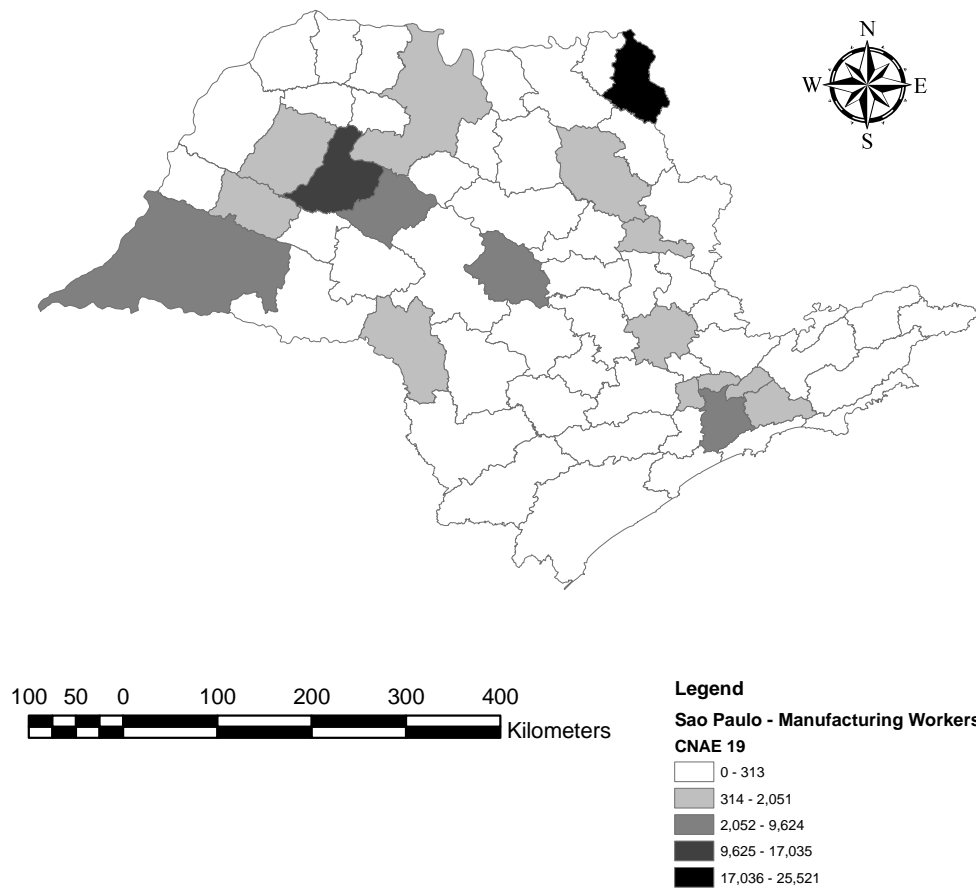
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)**



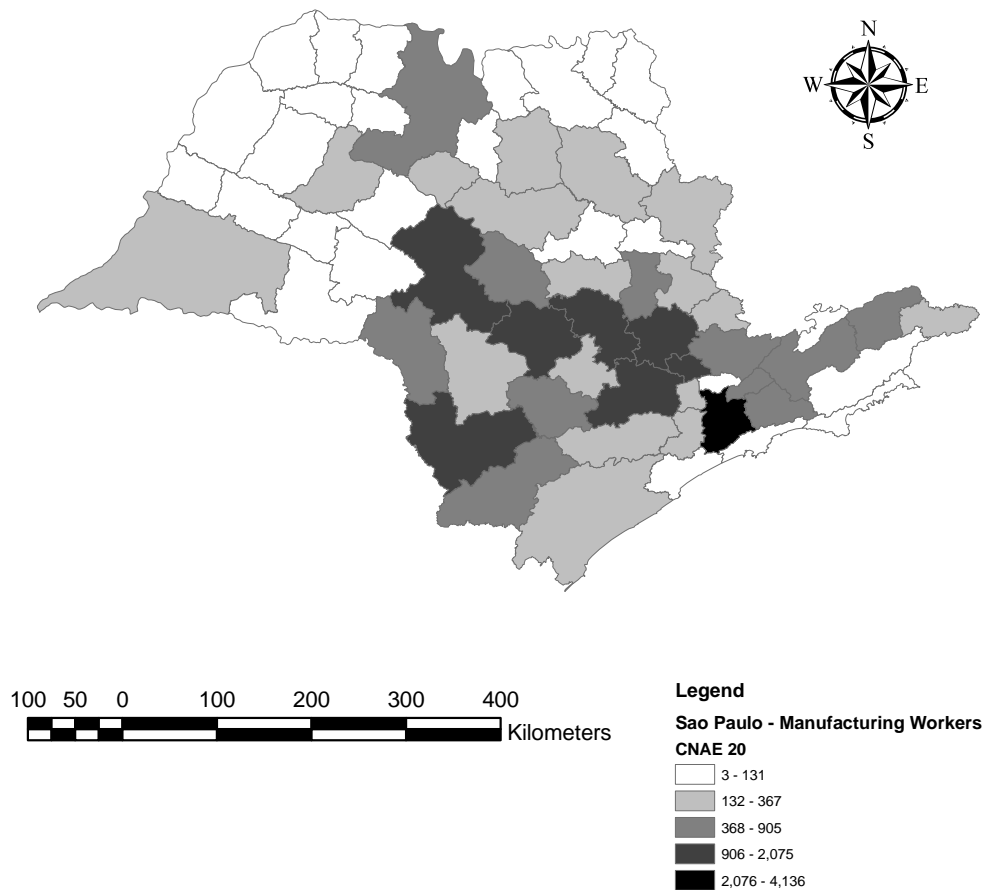
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



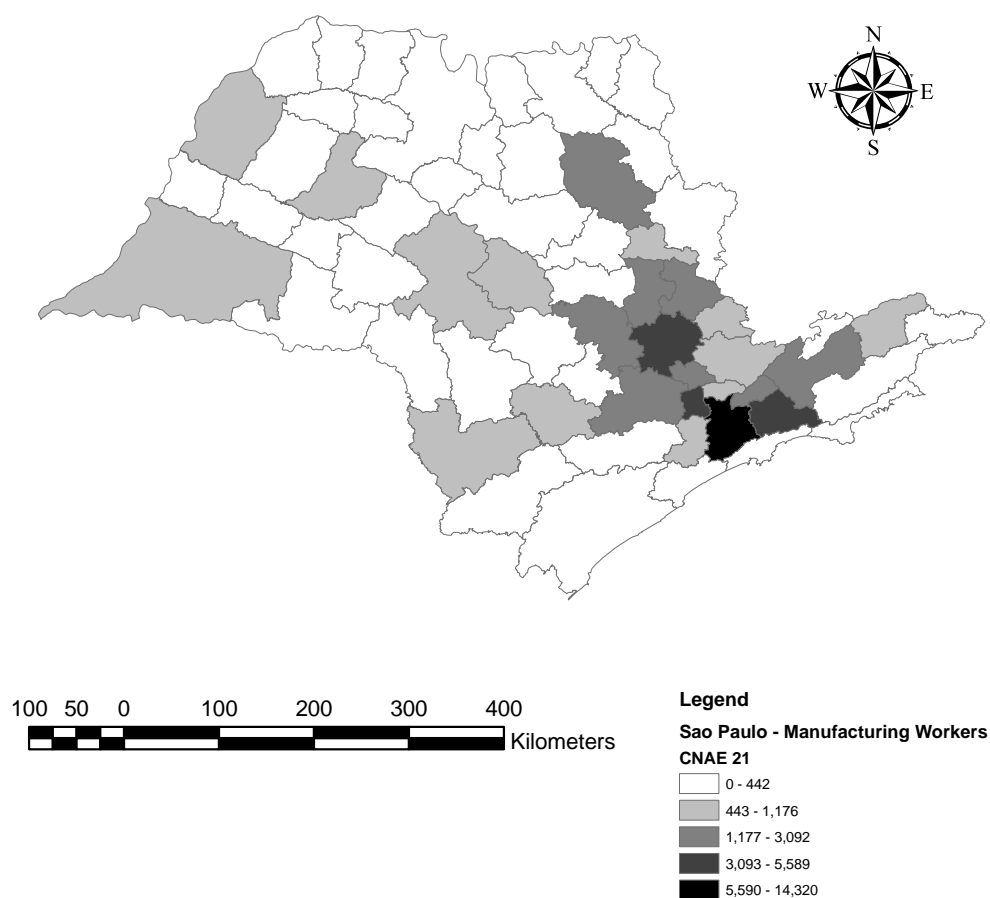
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



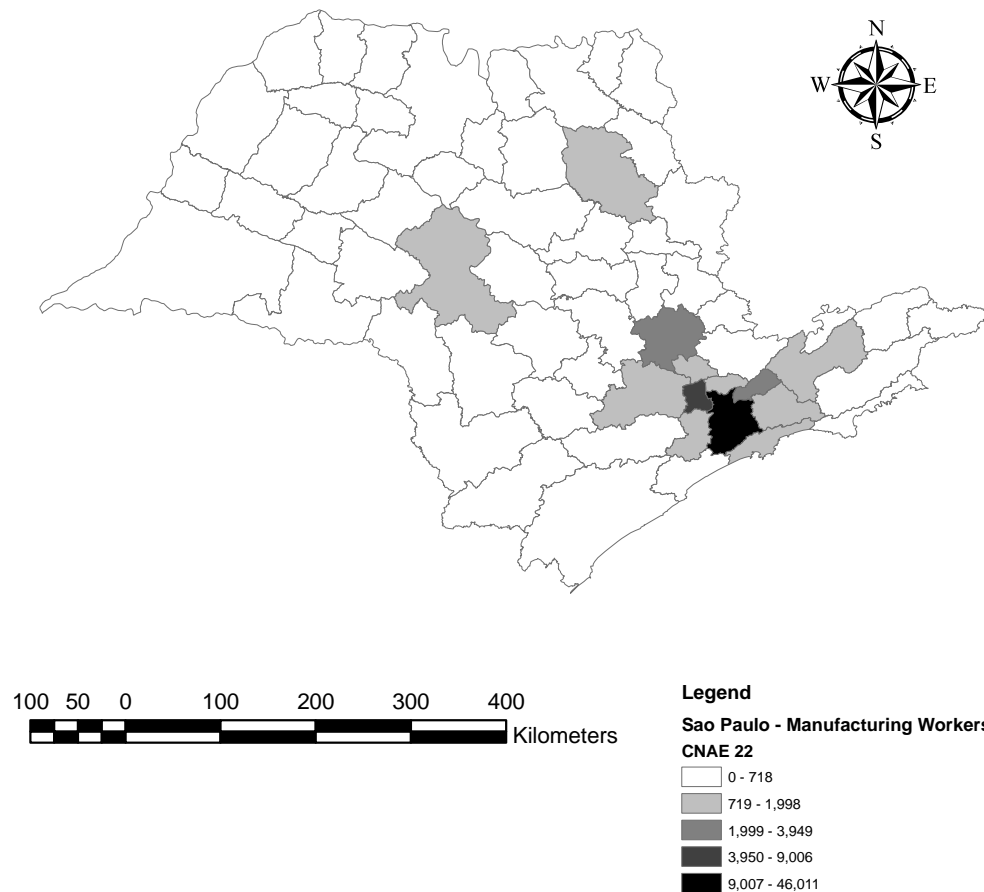
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



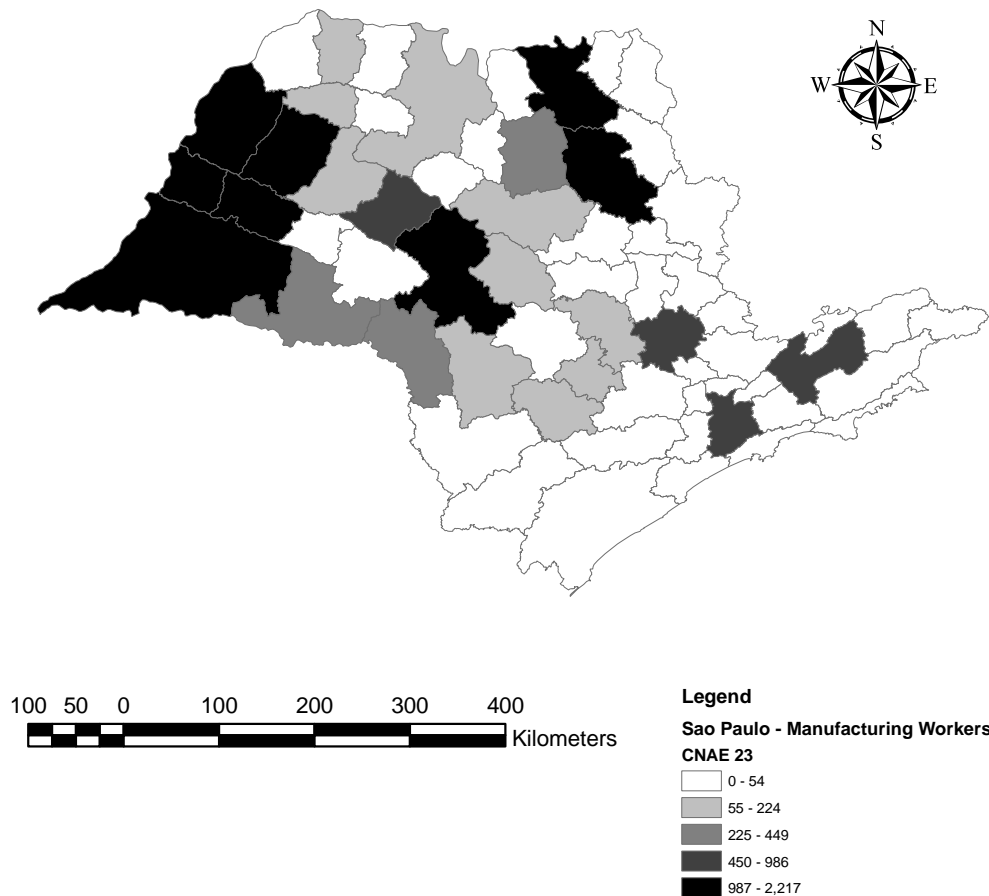
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)***



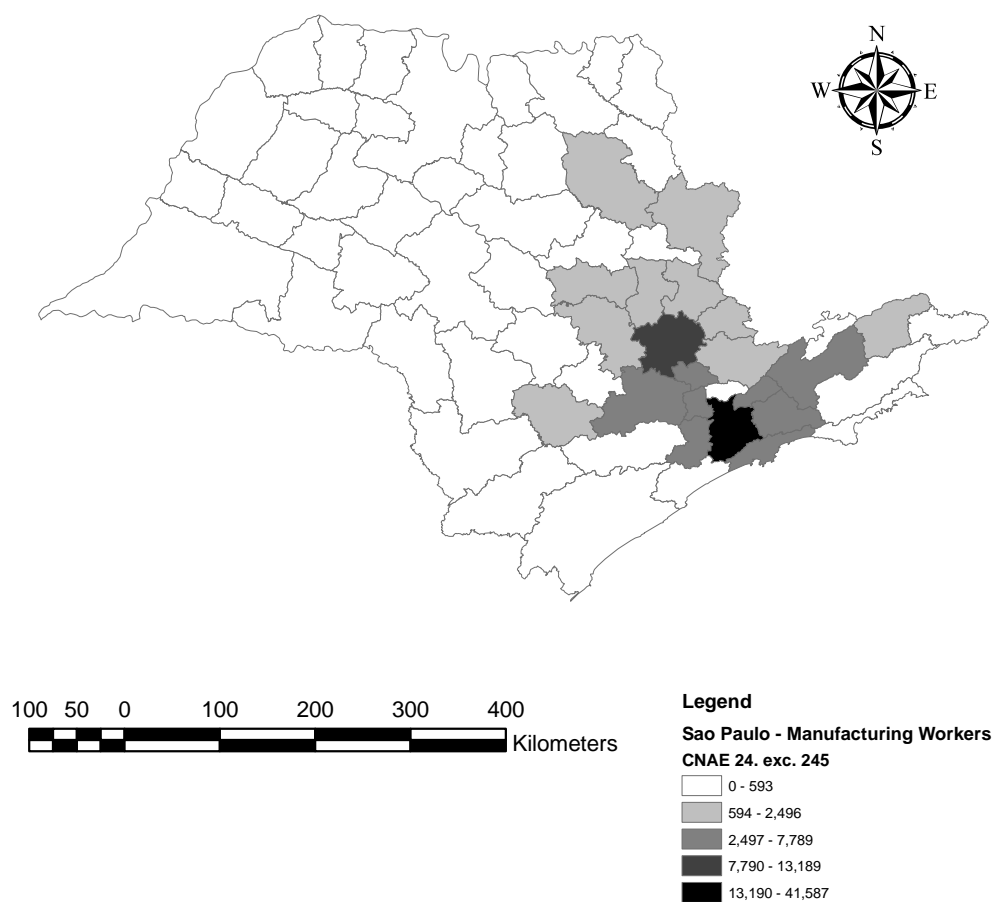
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)**



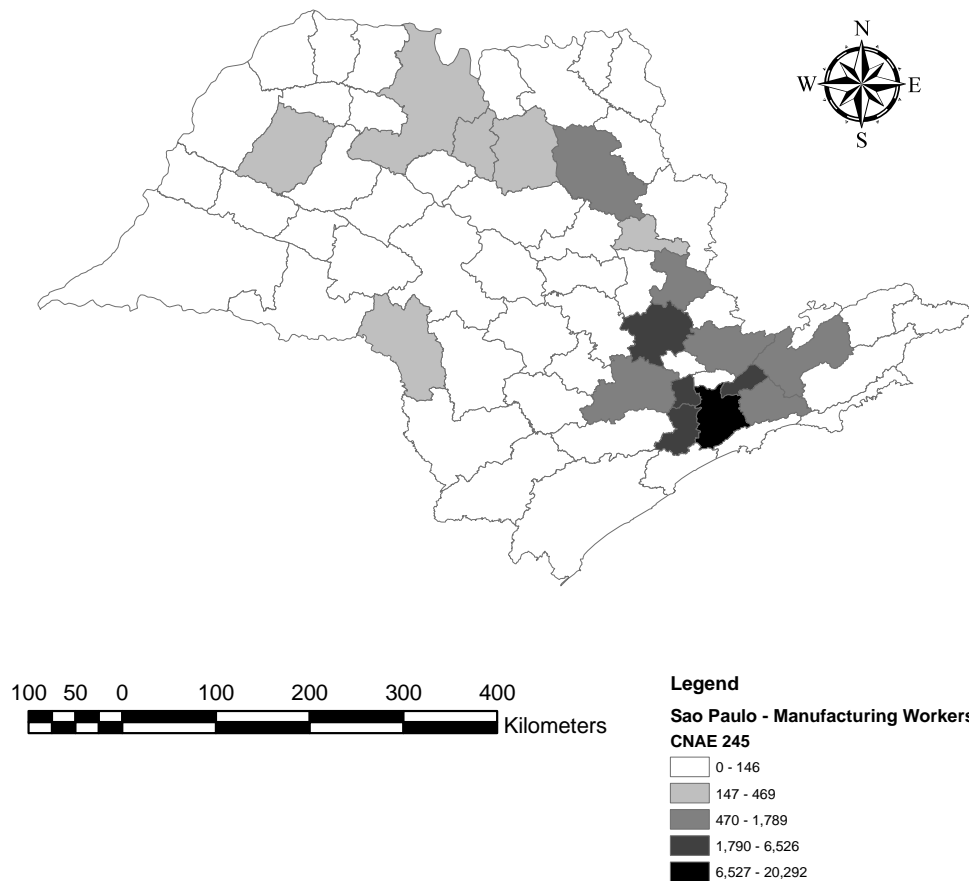
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 24, exc.
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



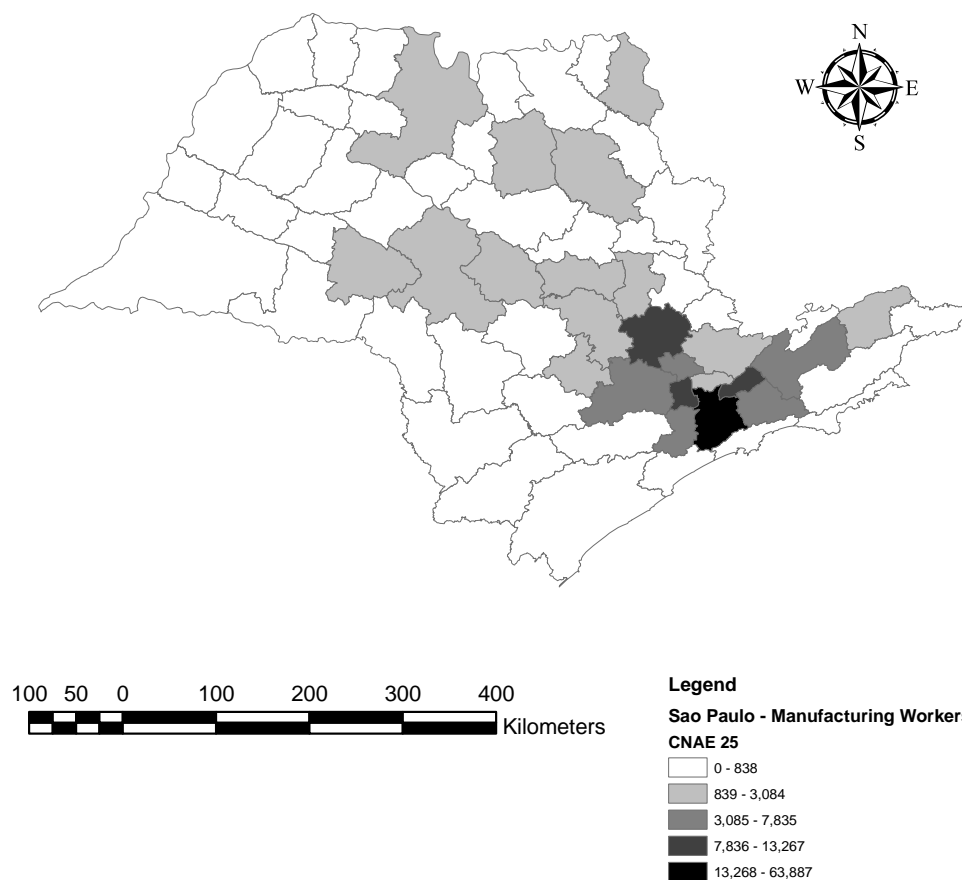
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



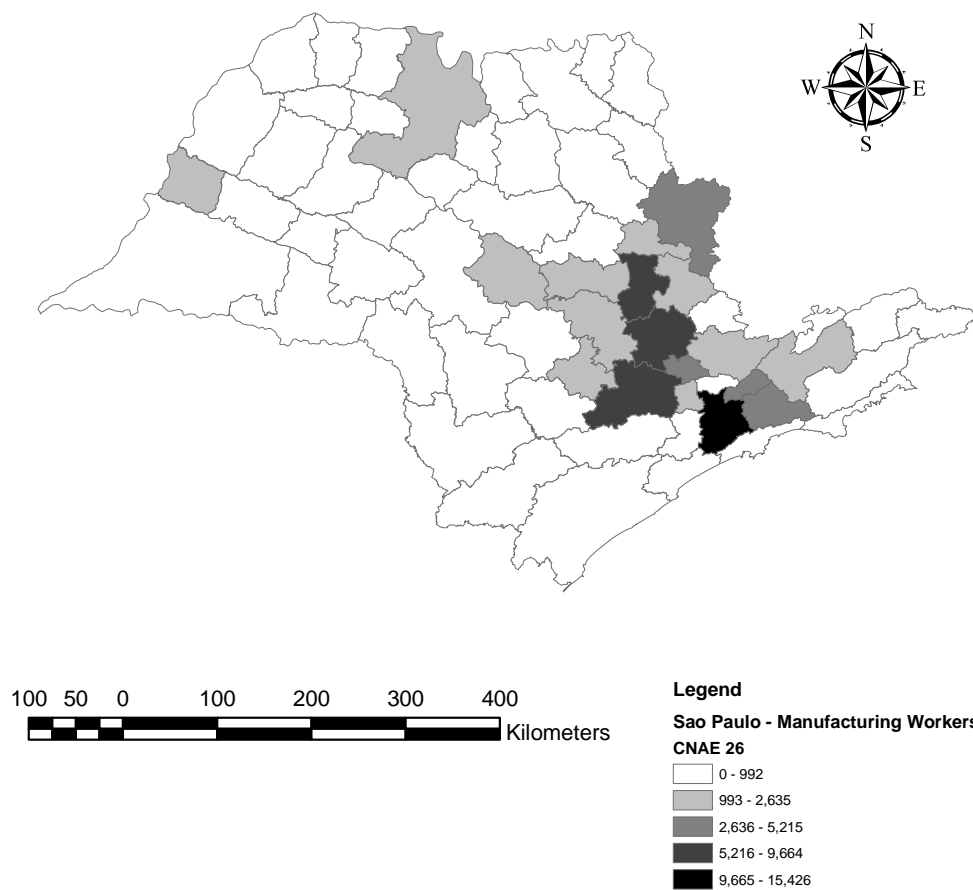
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



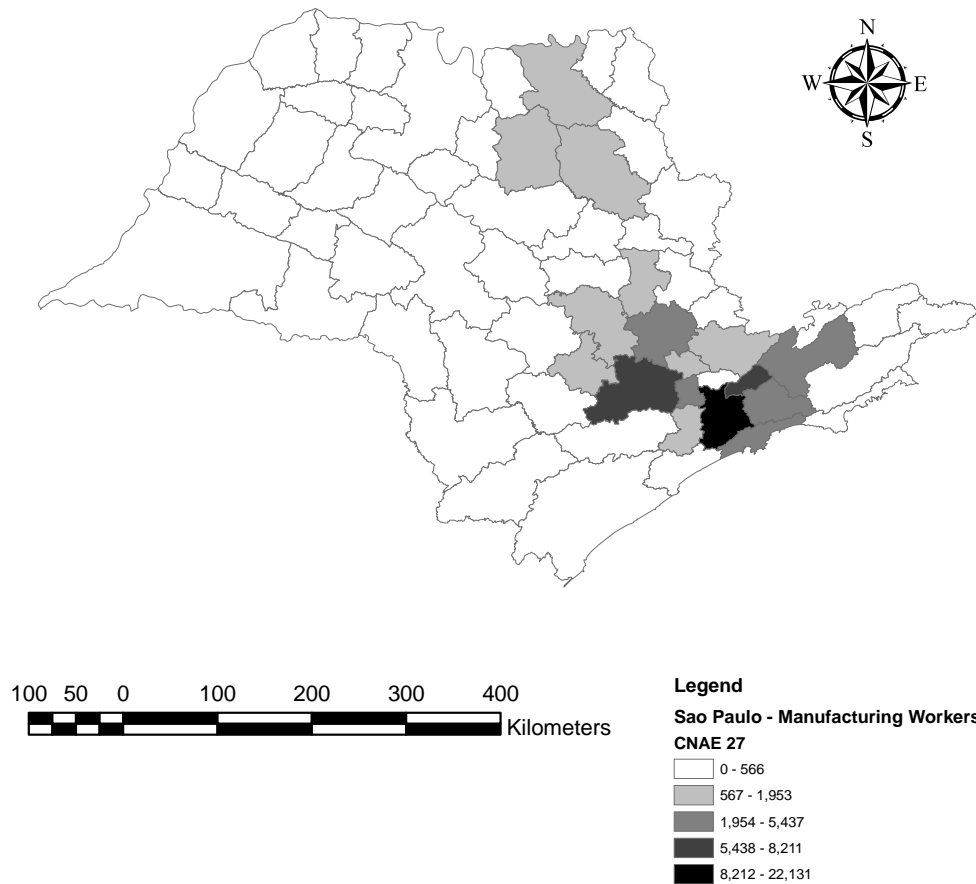
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



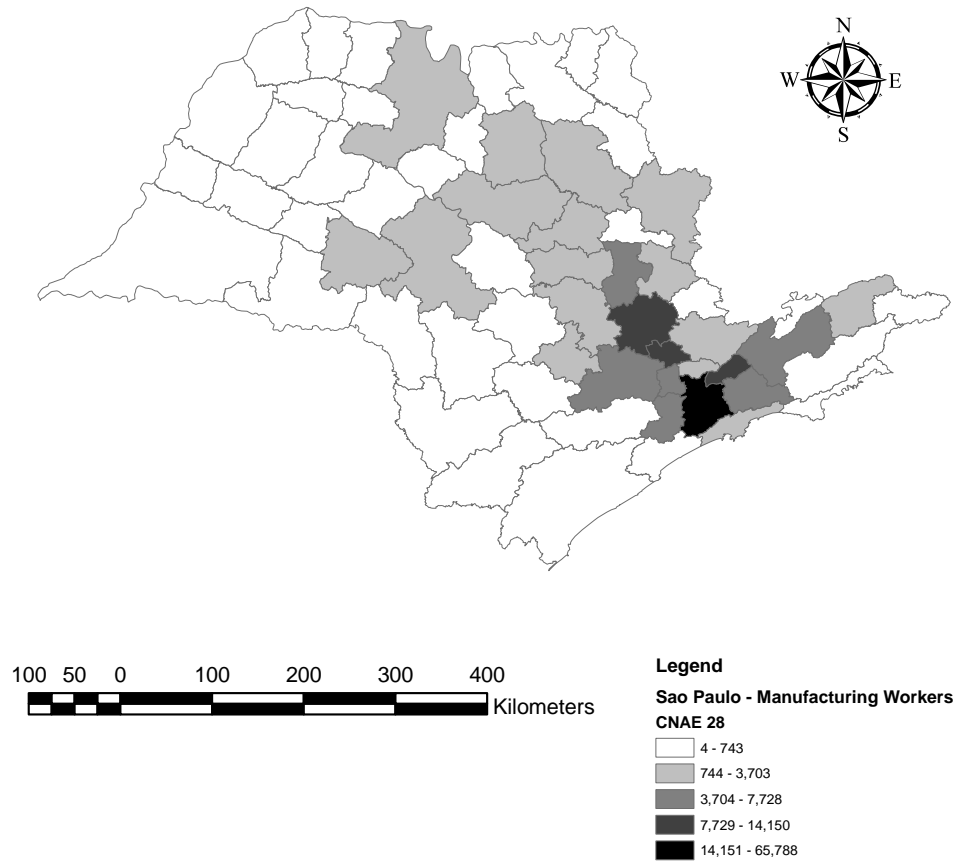
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

***Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)***



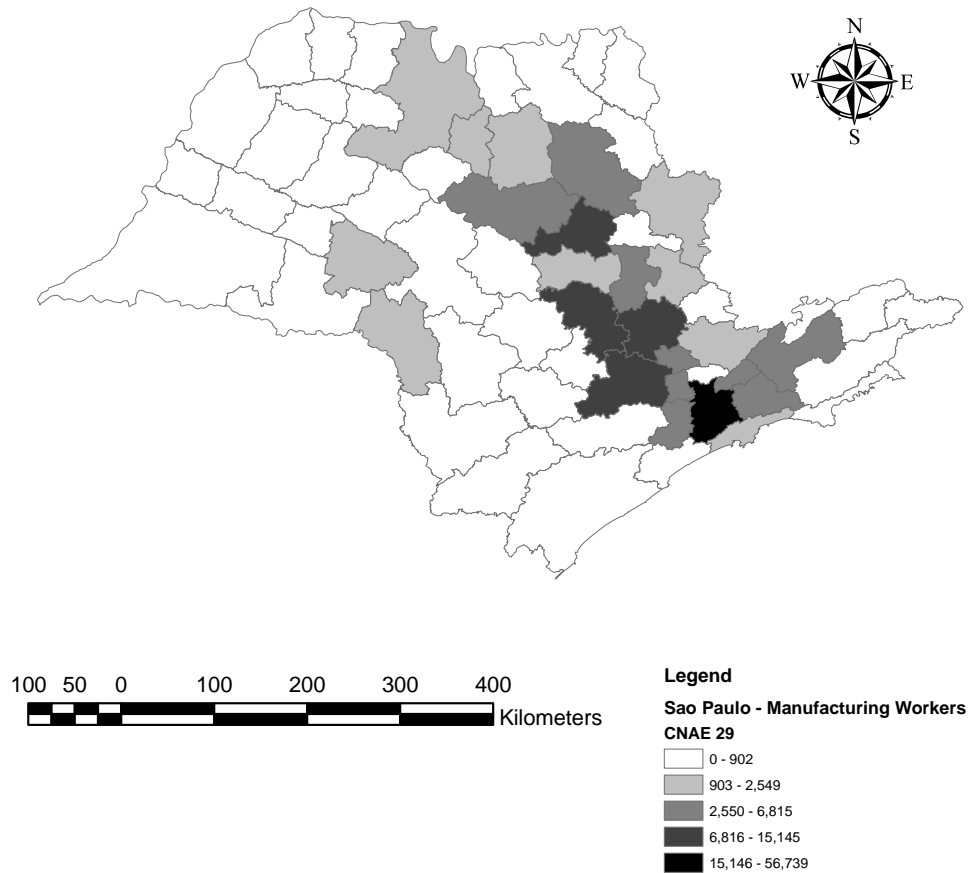
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



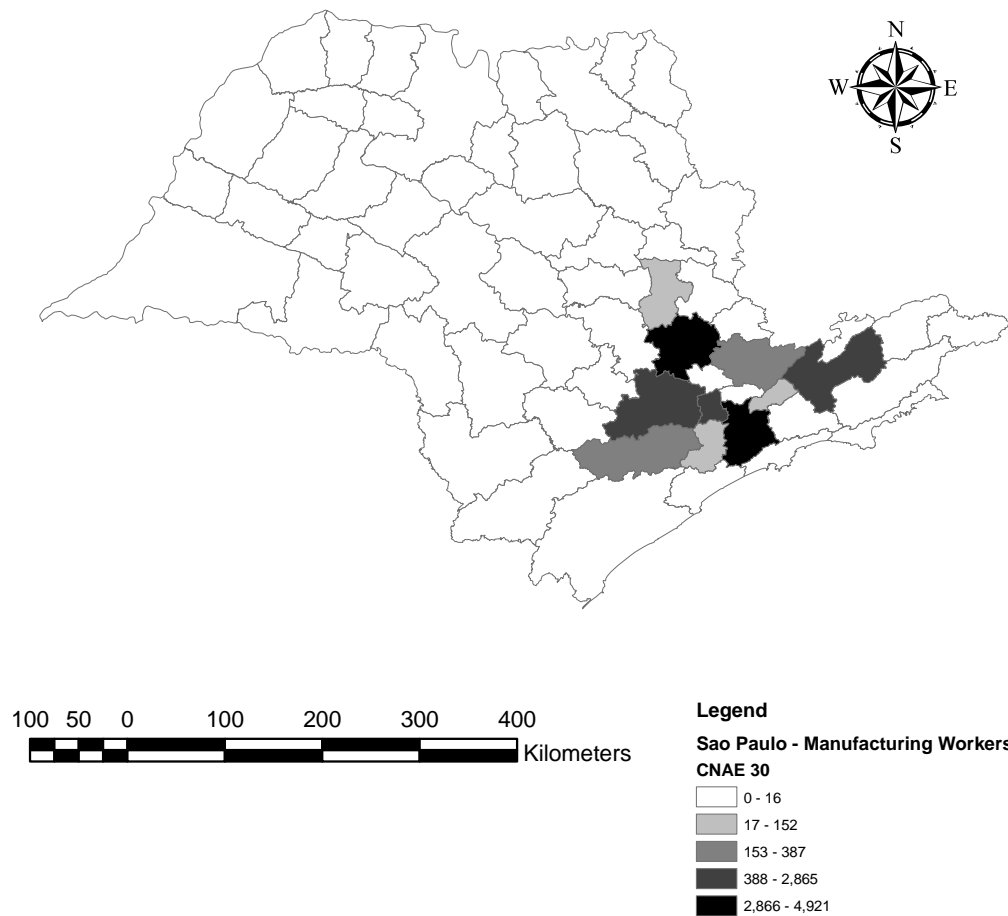
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



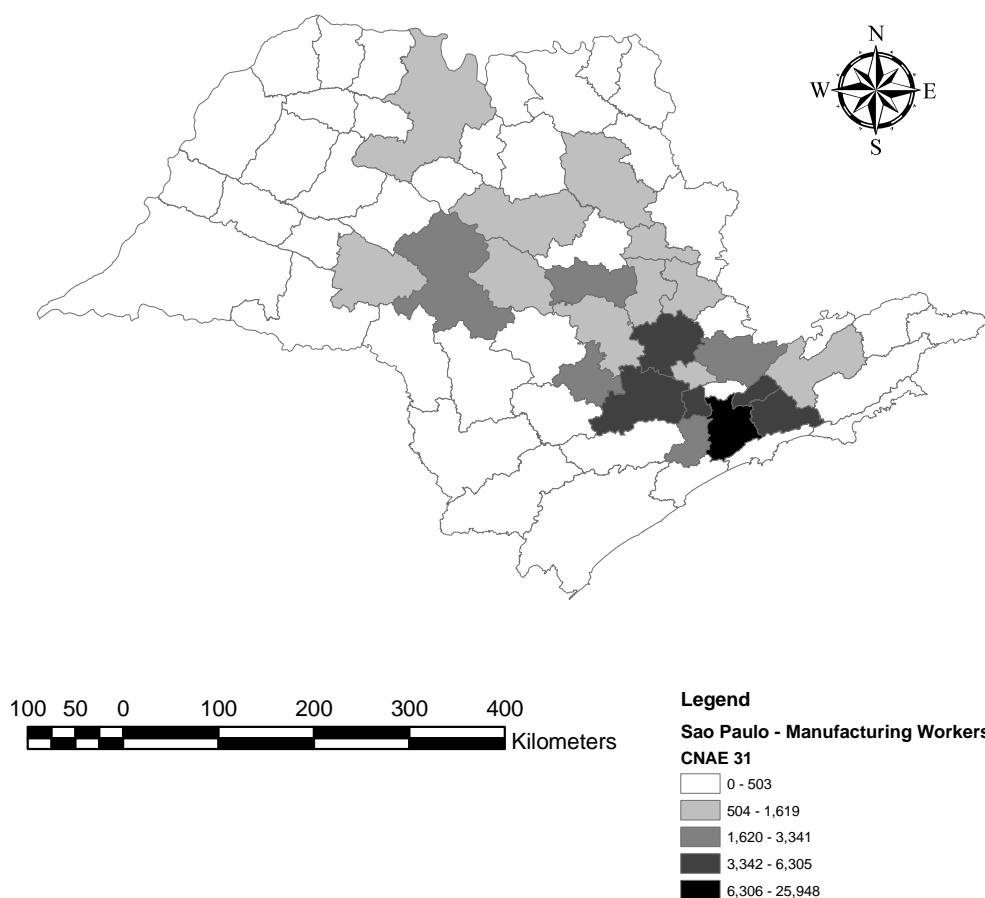
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting
and computing machinery)**



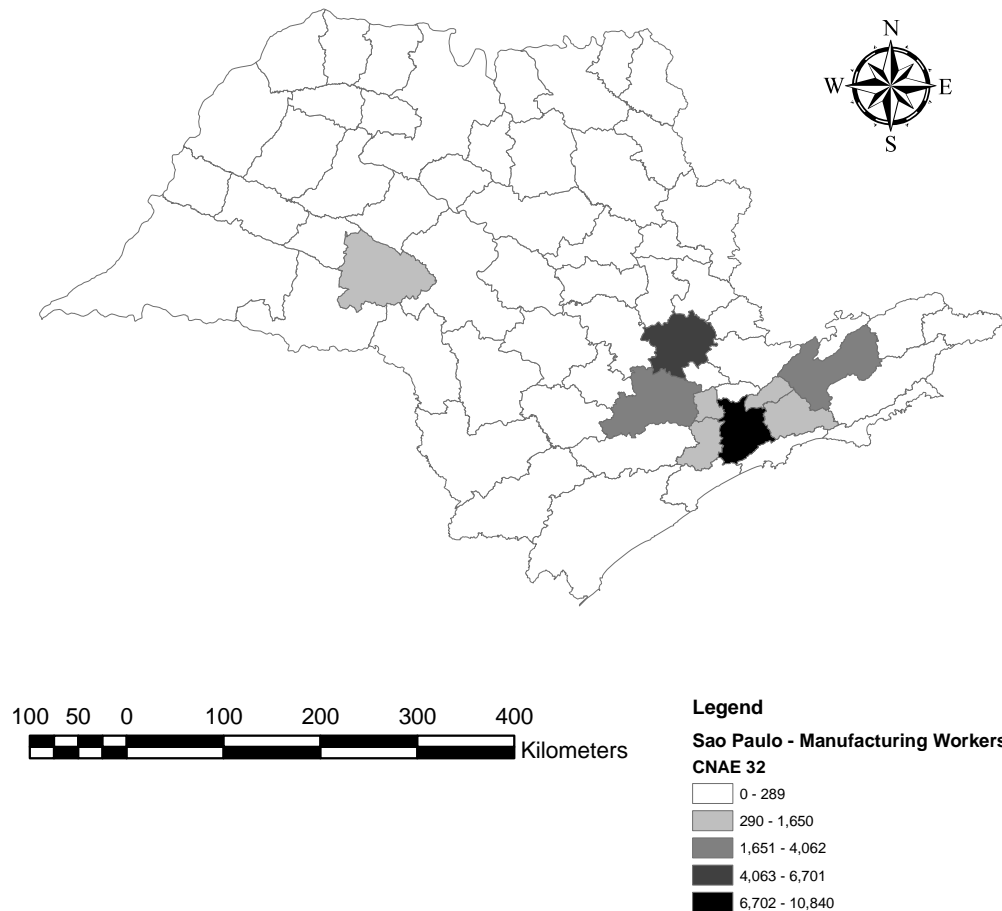
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



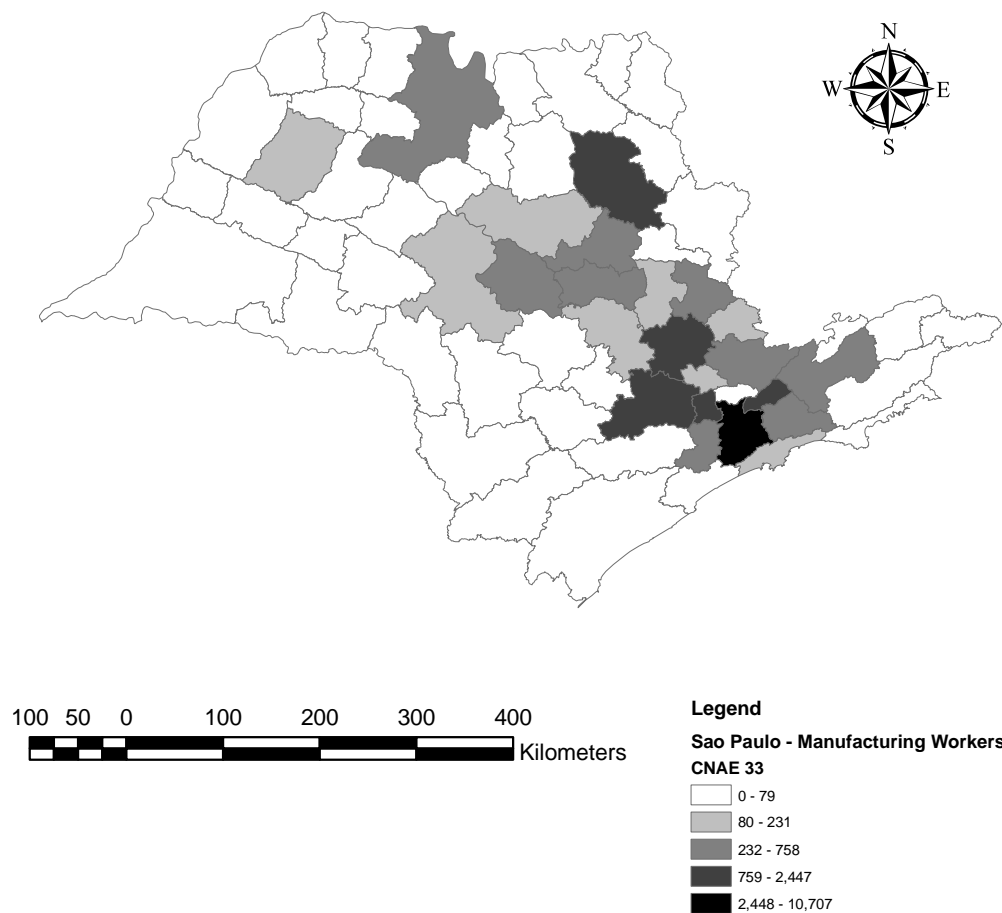
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and
communication equipment and apparatus)**



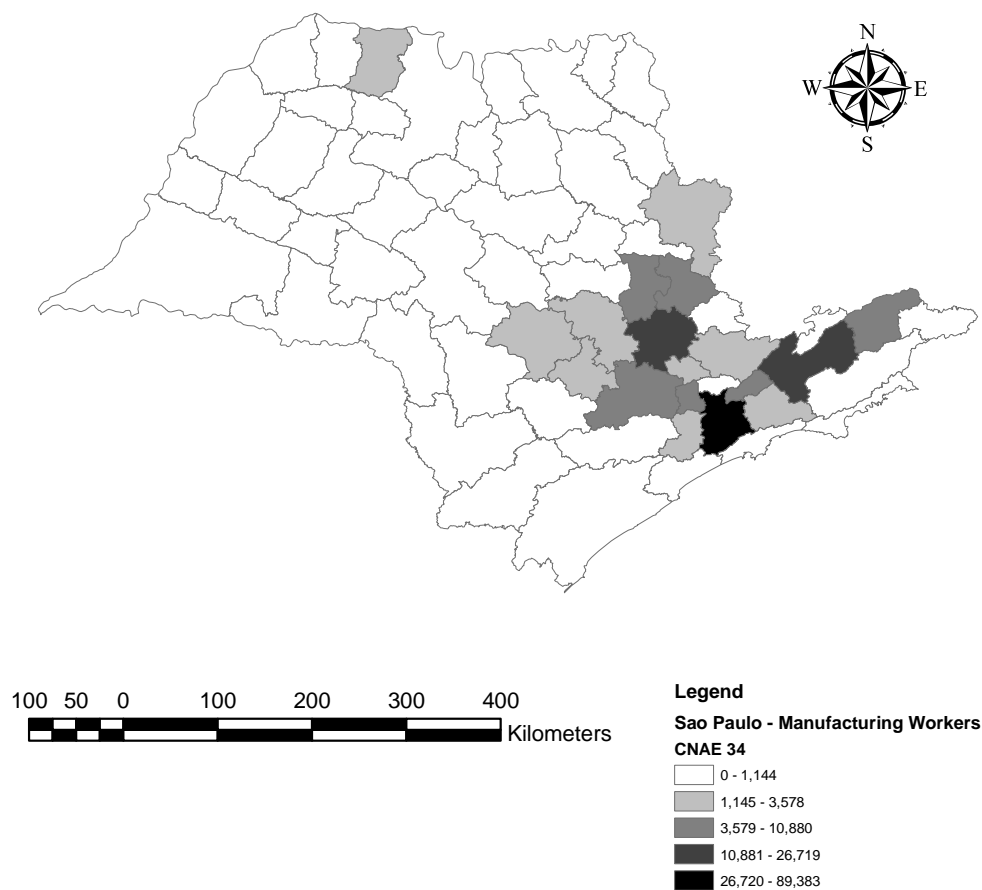
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)***



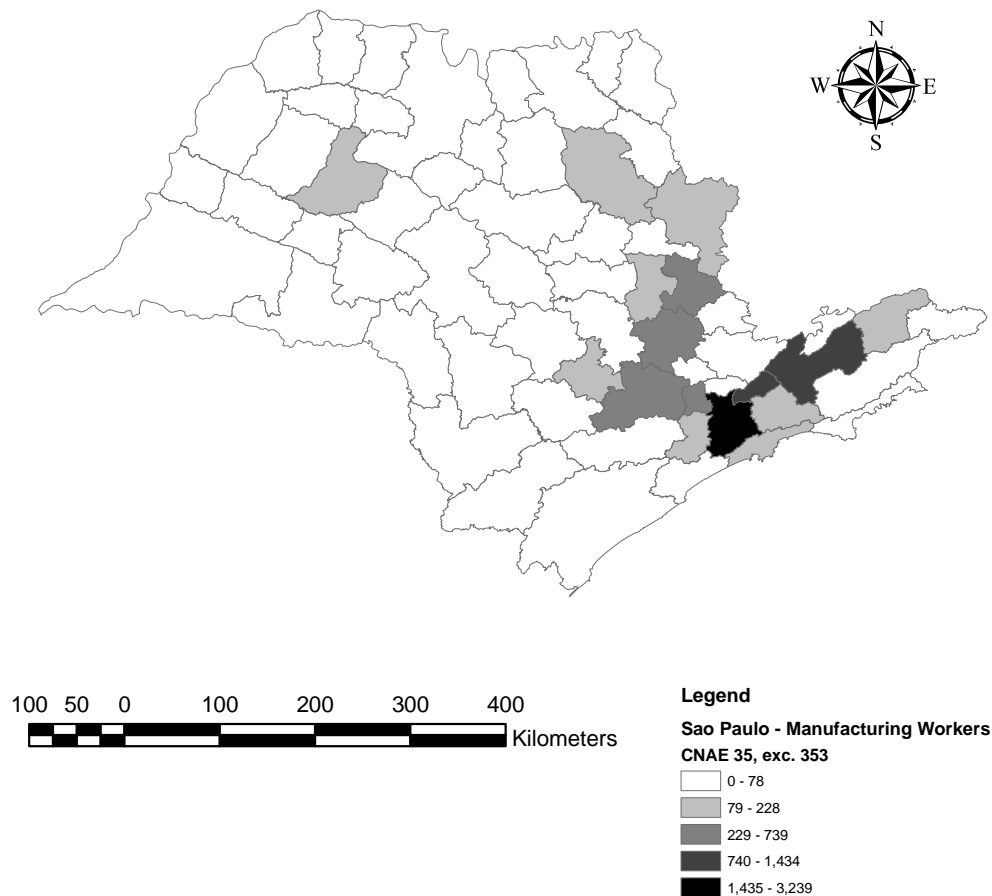
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



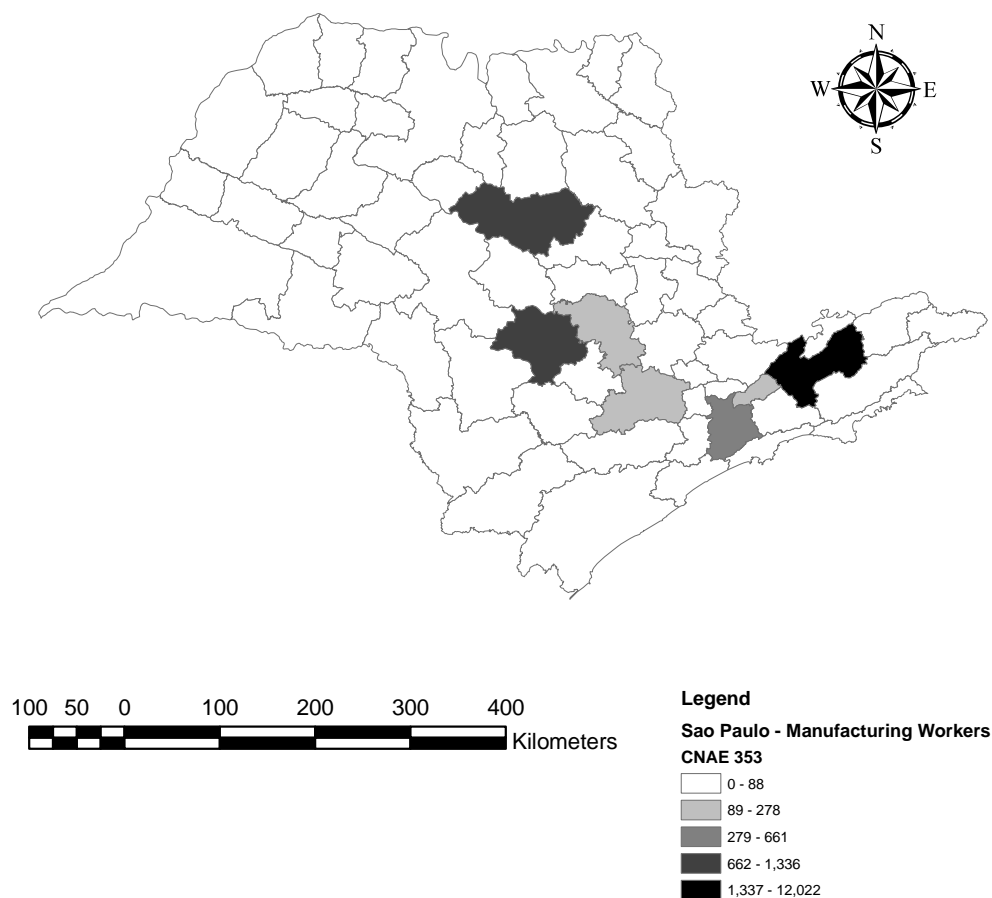
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



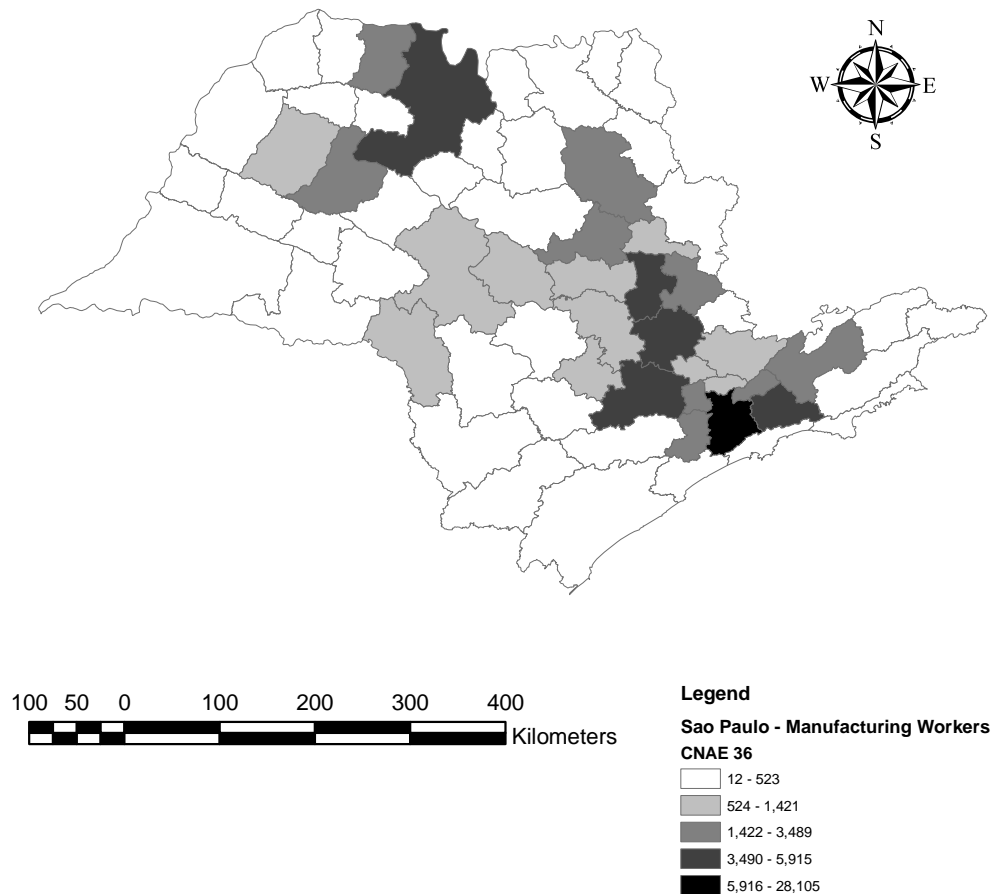
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



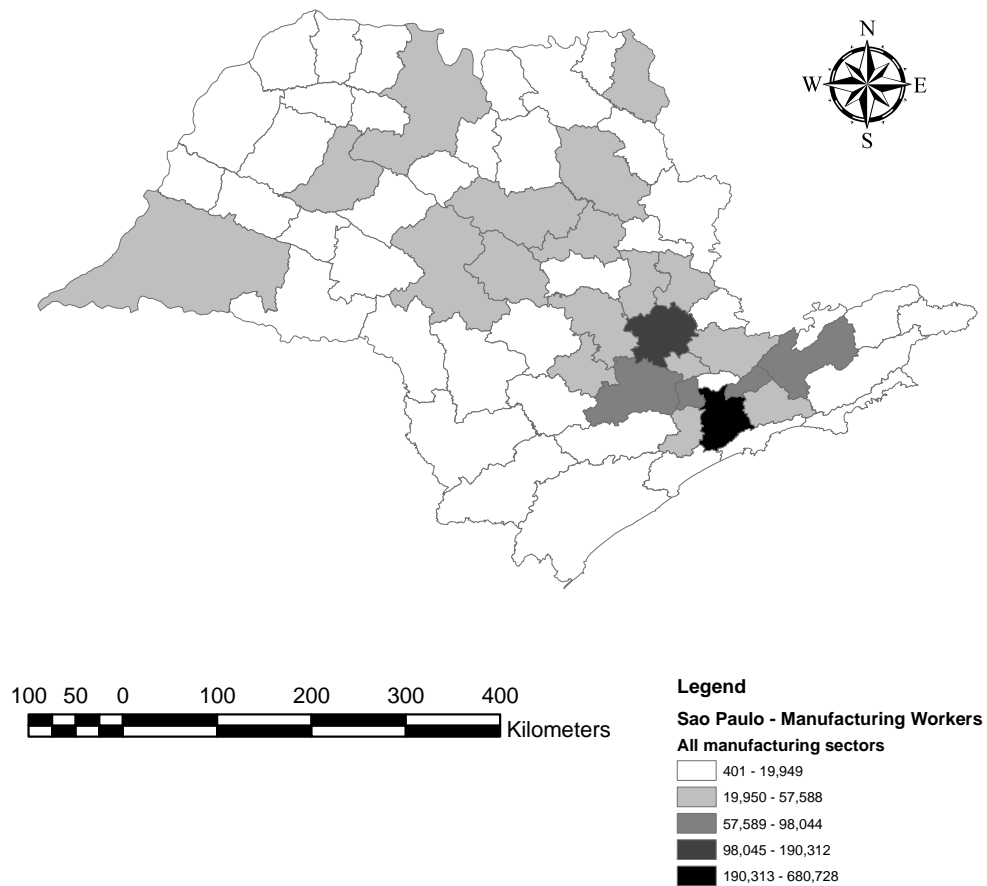
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)***



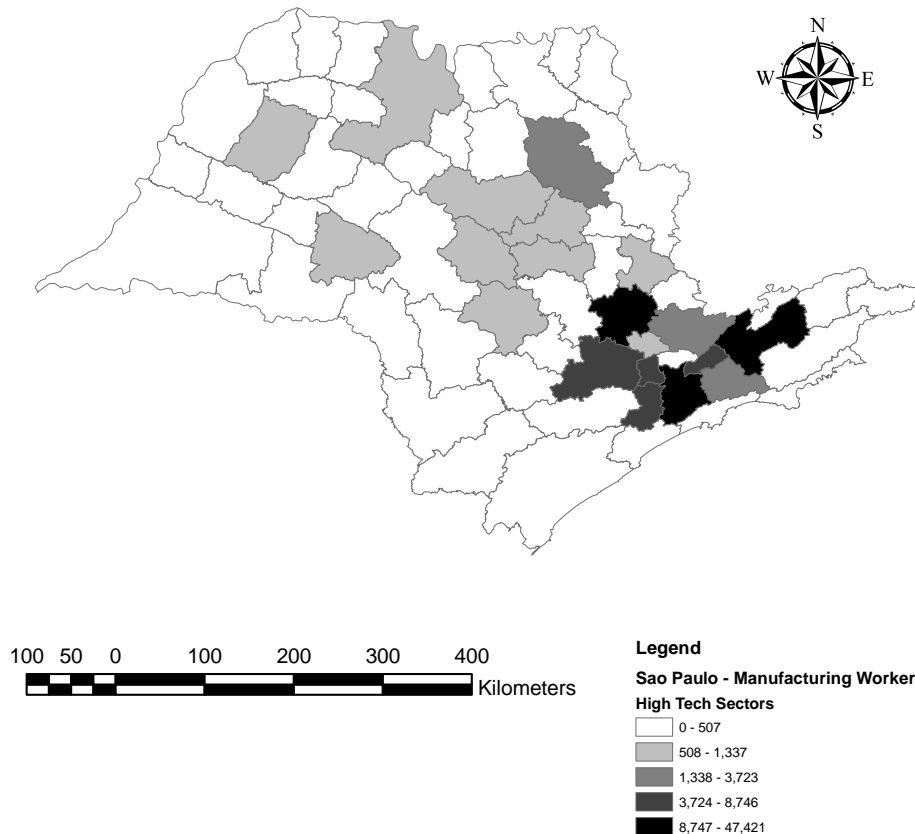
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
workers in manufacturing in 2005
All manufacturing sectors***



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

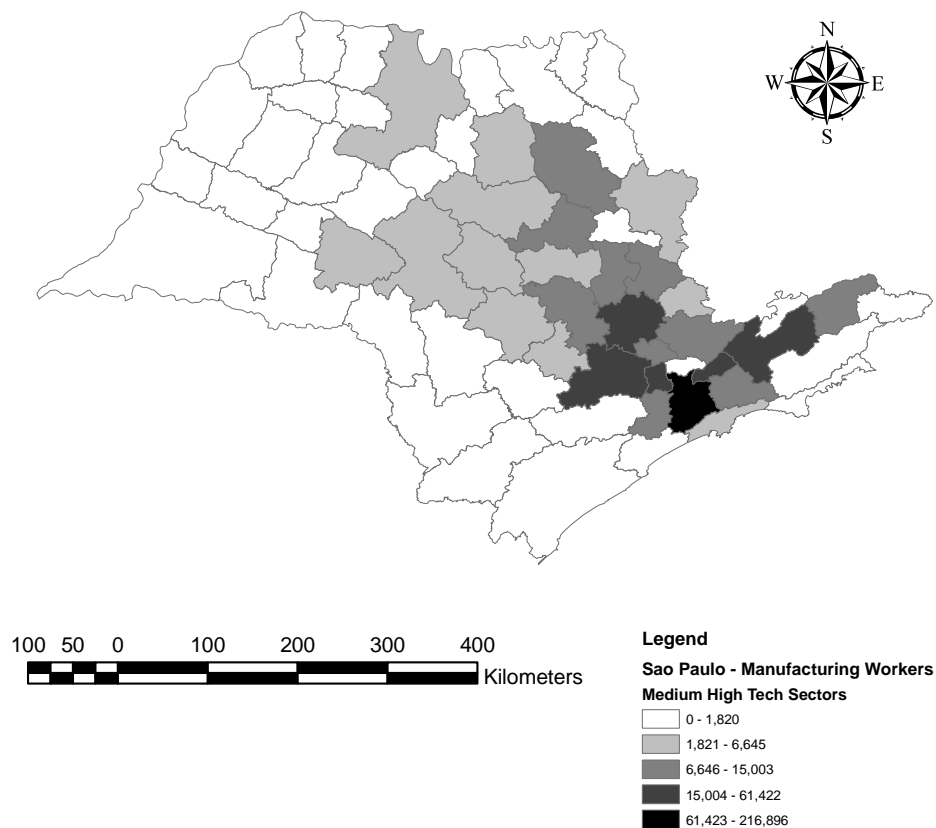
**Sao Paulo: regional distribution of
workers in manufacturing in 2005
High Tech Sectors (1)**



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

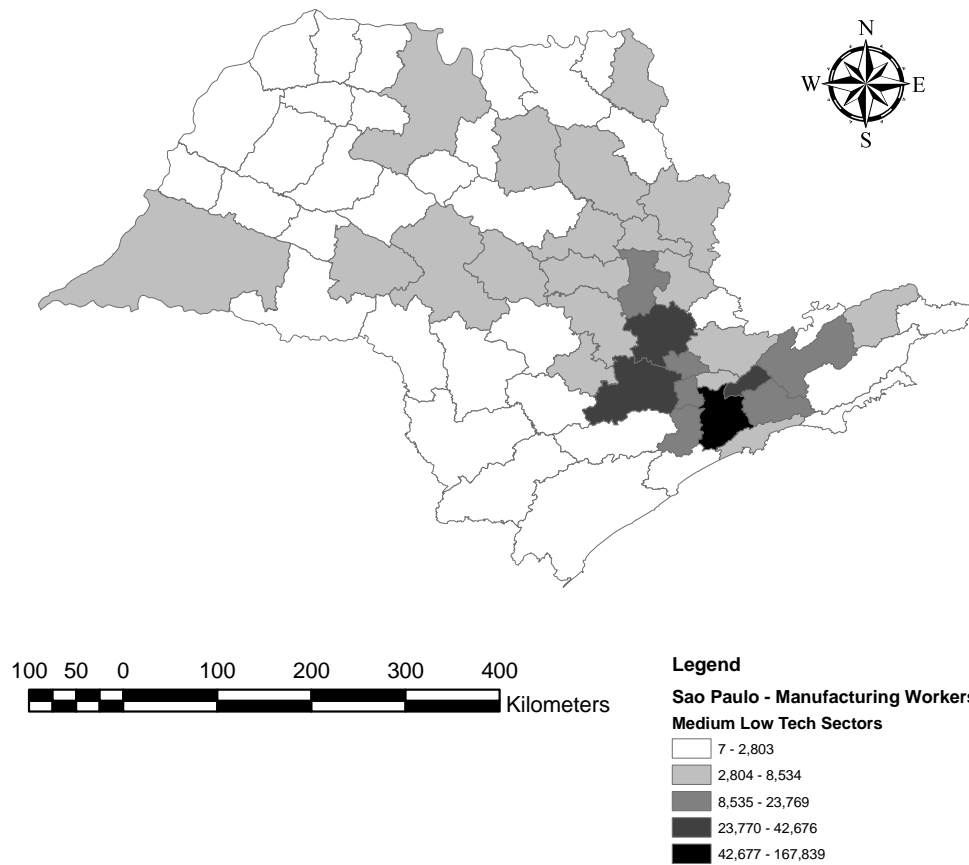
**Sao Paulo: regional distribution of
workers in manufacturing in 2005
Medium High Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

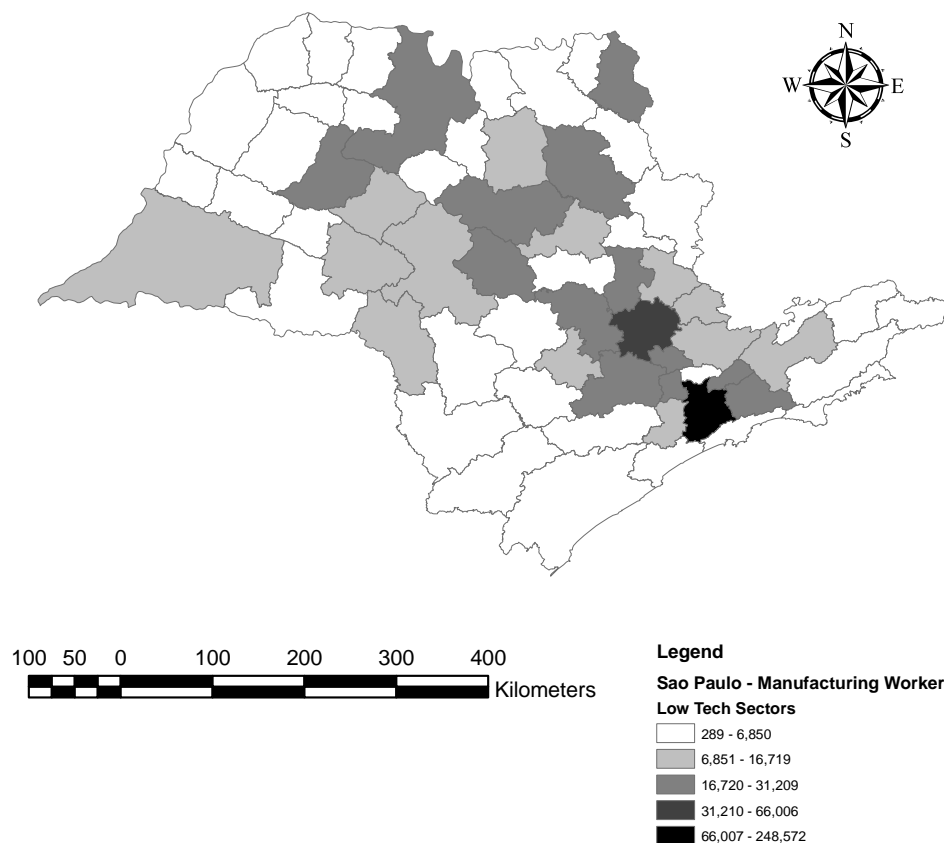
**Sao Paulo: regional distribution of
workers in manufacturing in 2005
Medium Low Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
workers in manufacturing in 2005
Low Tech Sectors (1)**



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

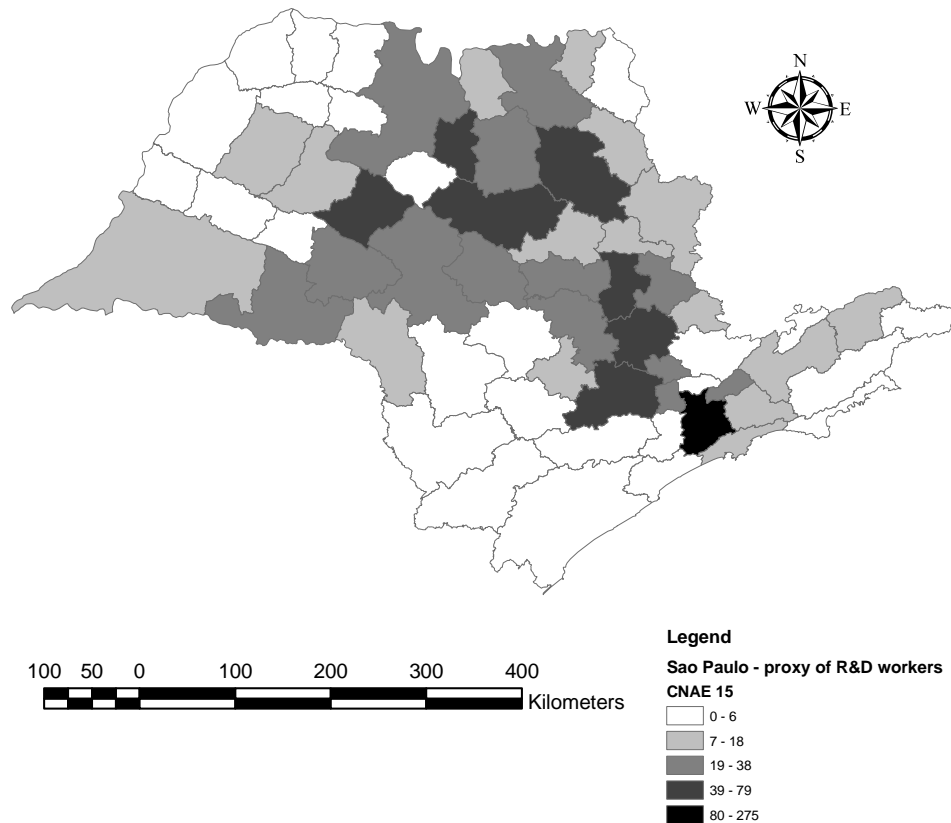
Map Set 3.4

*Regional Distribution of R&D-
Related Workers in the State of
São Paulo by*

*Industrial Divisions (CNAE and
ISIC Rev.3) and Technological
Classification*

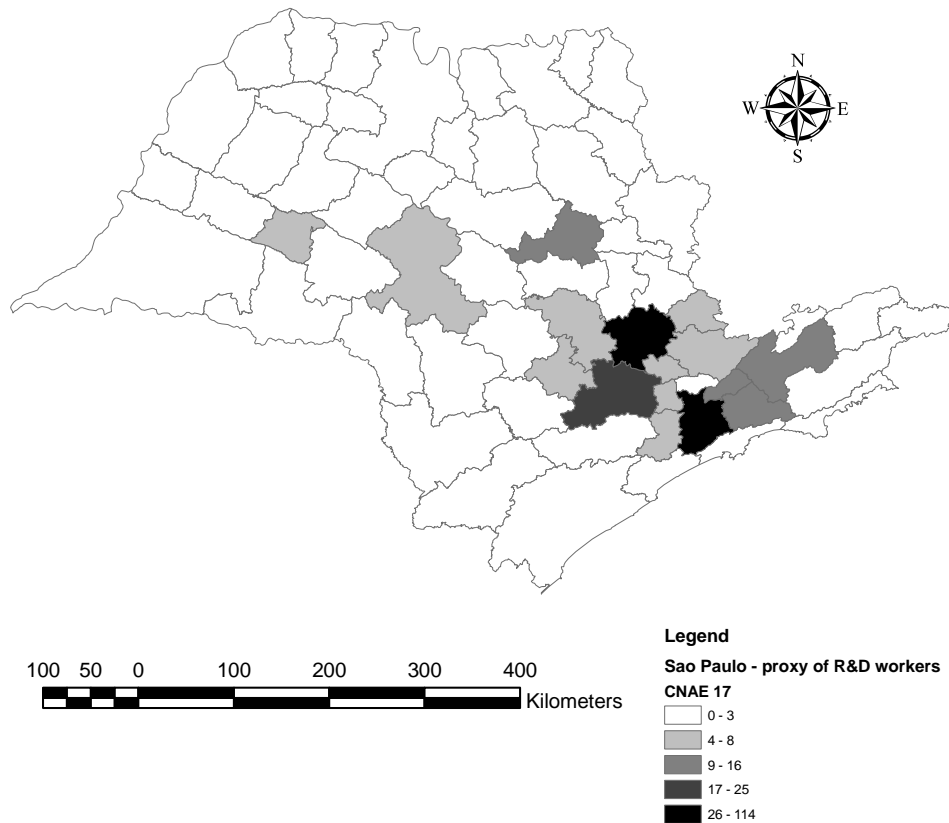
(2000, 2003 and 2005)

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)**



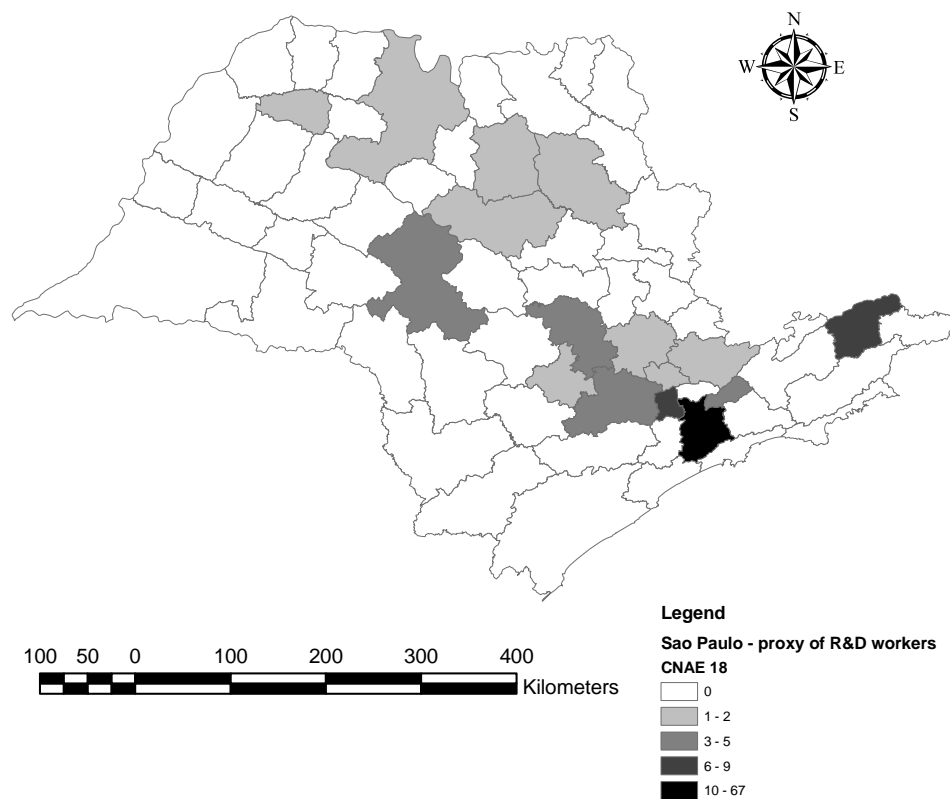
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



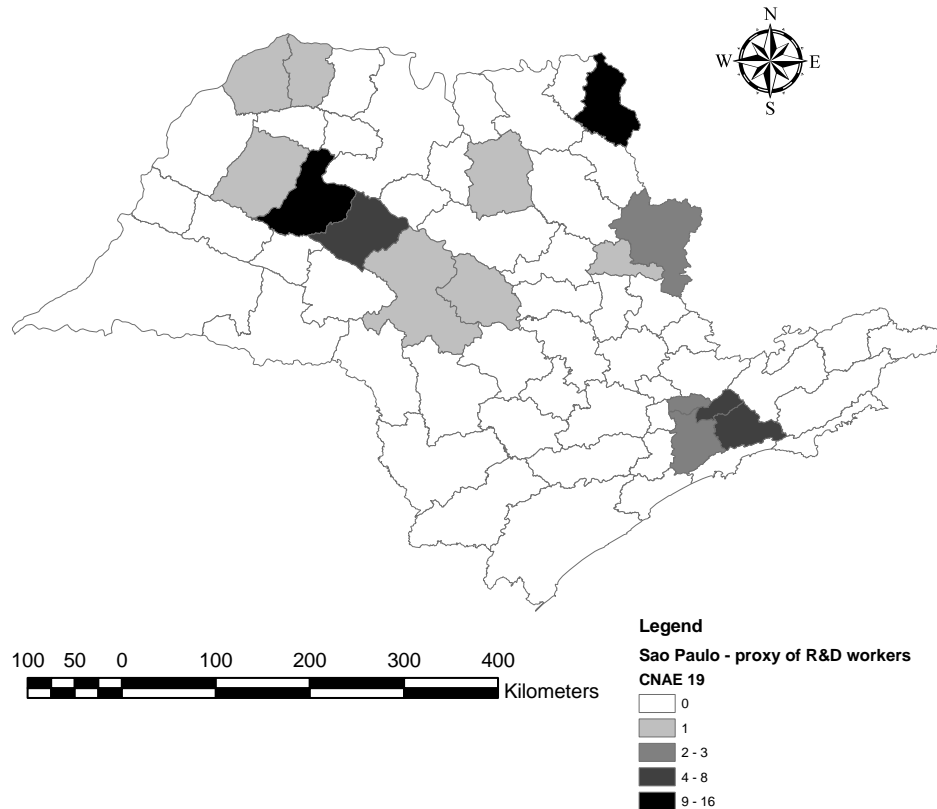
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)**



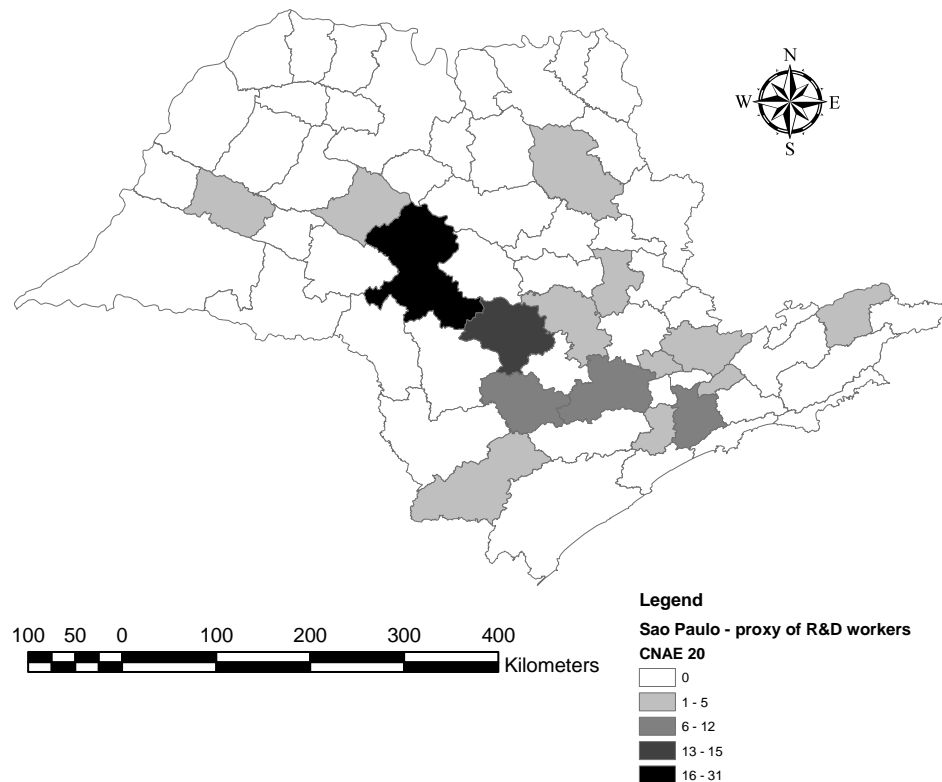
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



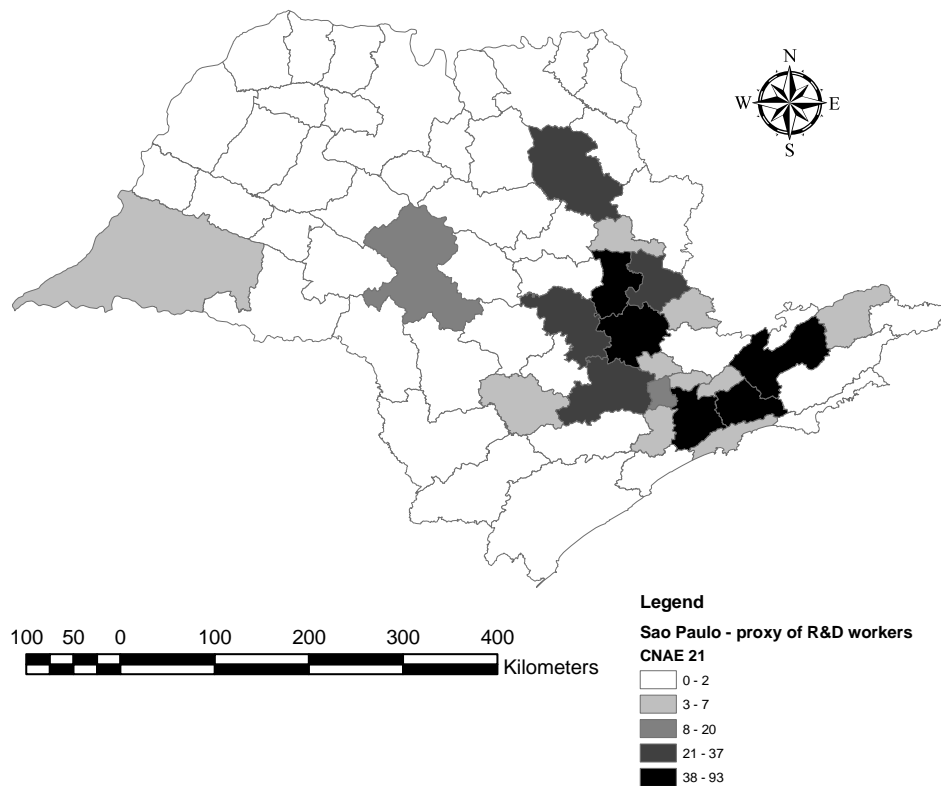
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)**



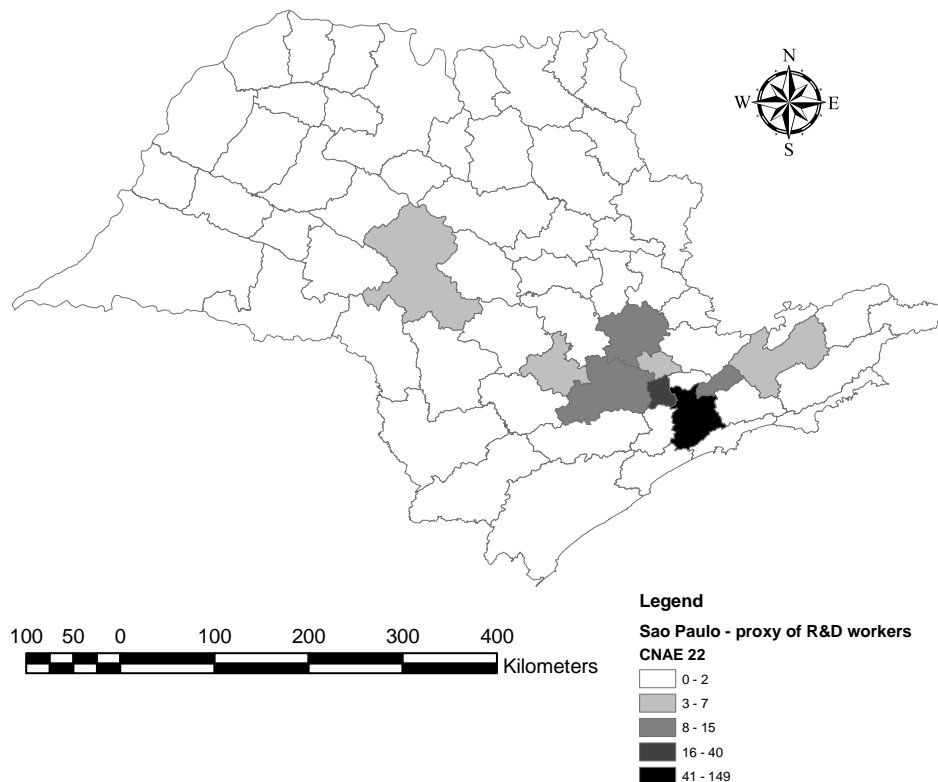
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



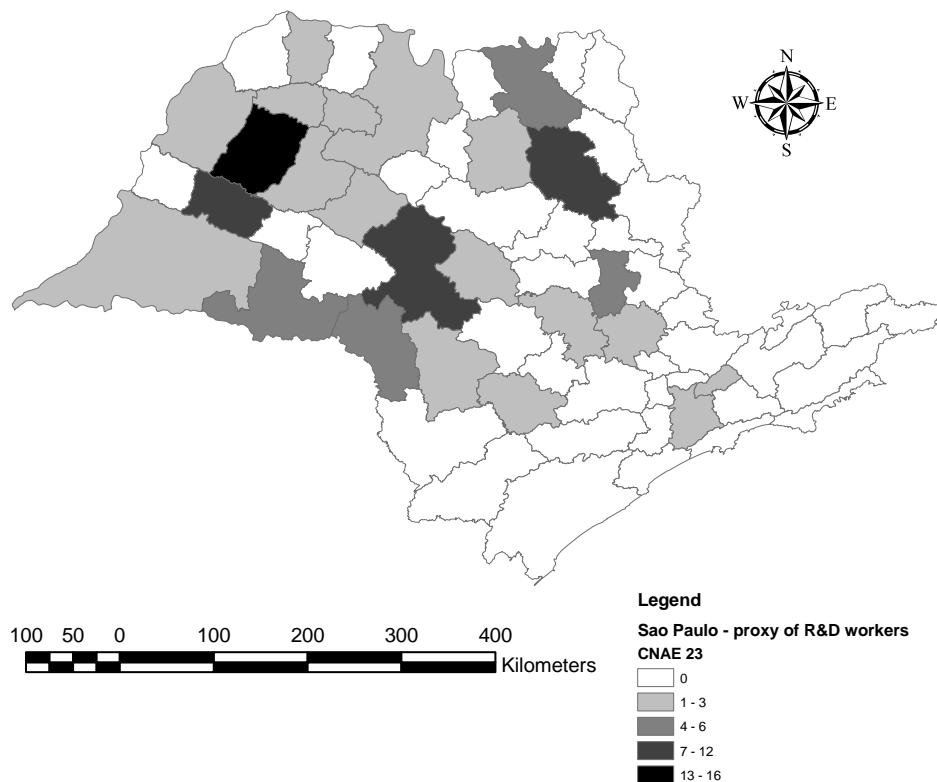
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



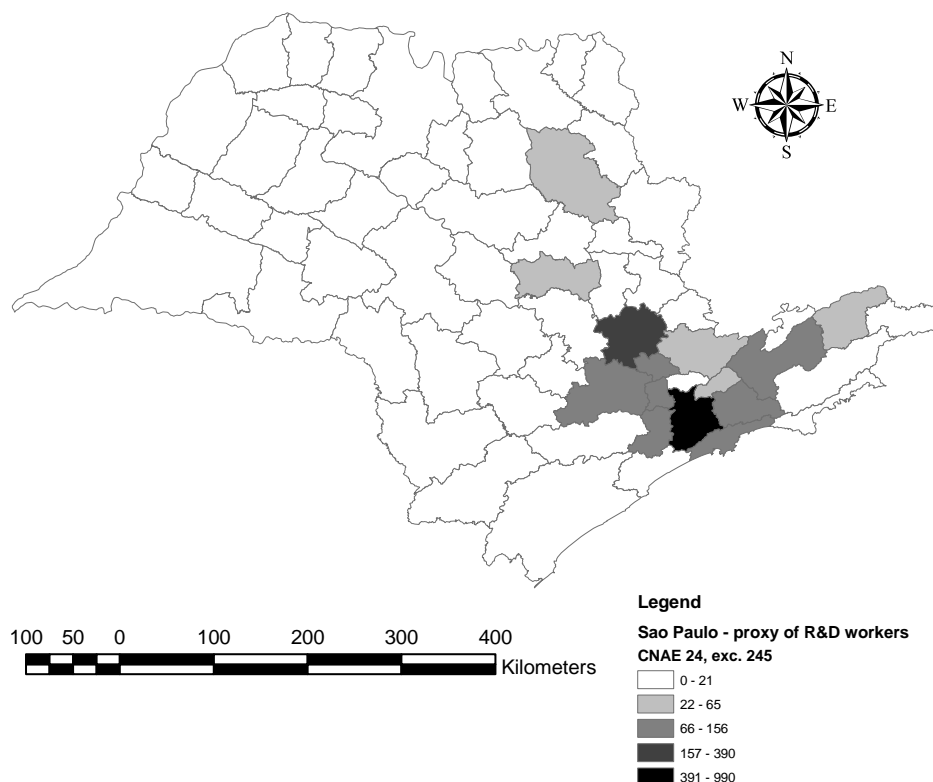
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)**



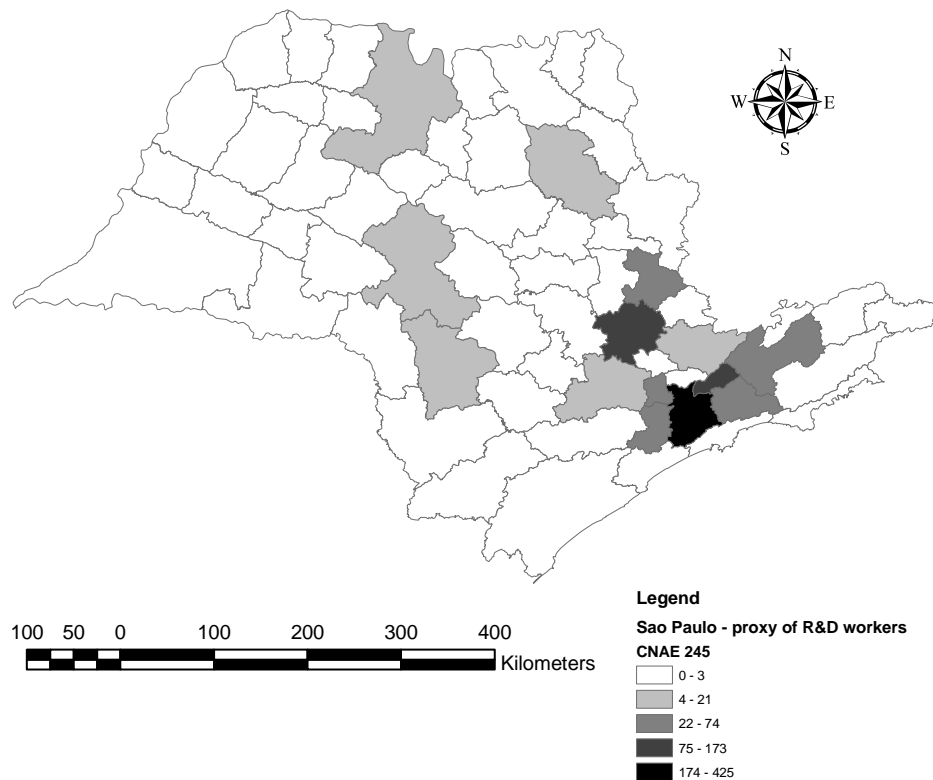
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 24, exc.
CNAE 245 /ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



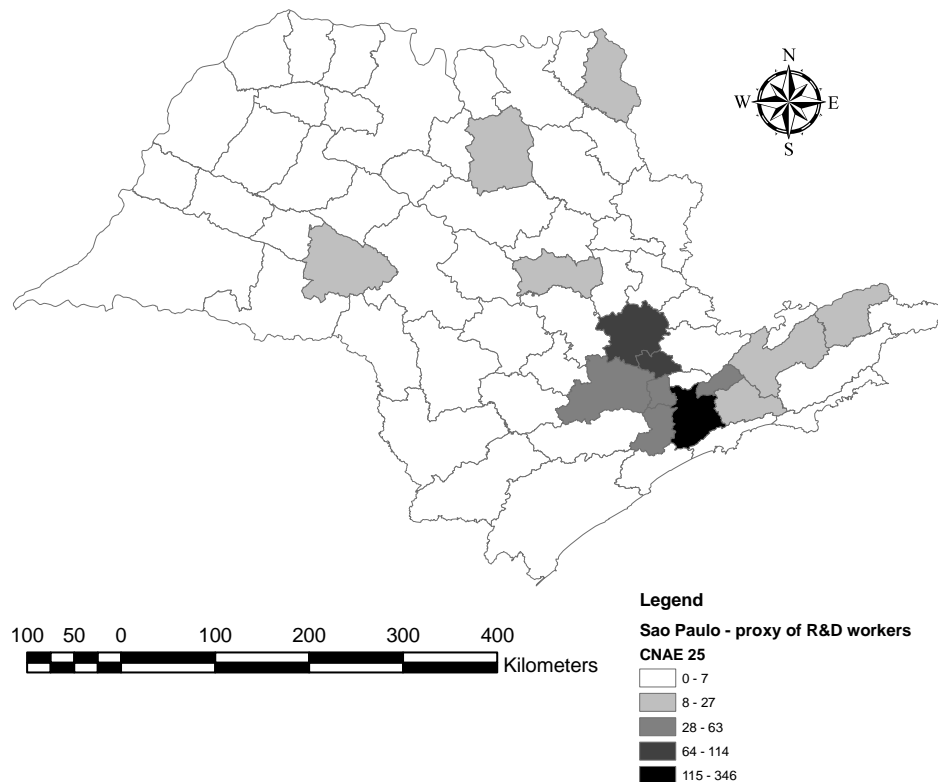
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE 245 /ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



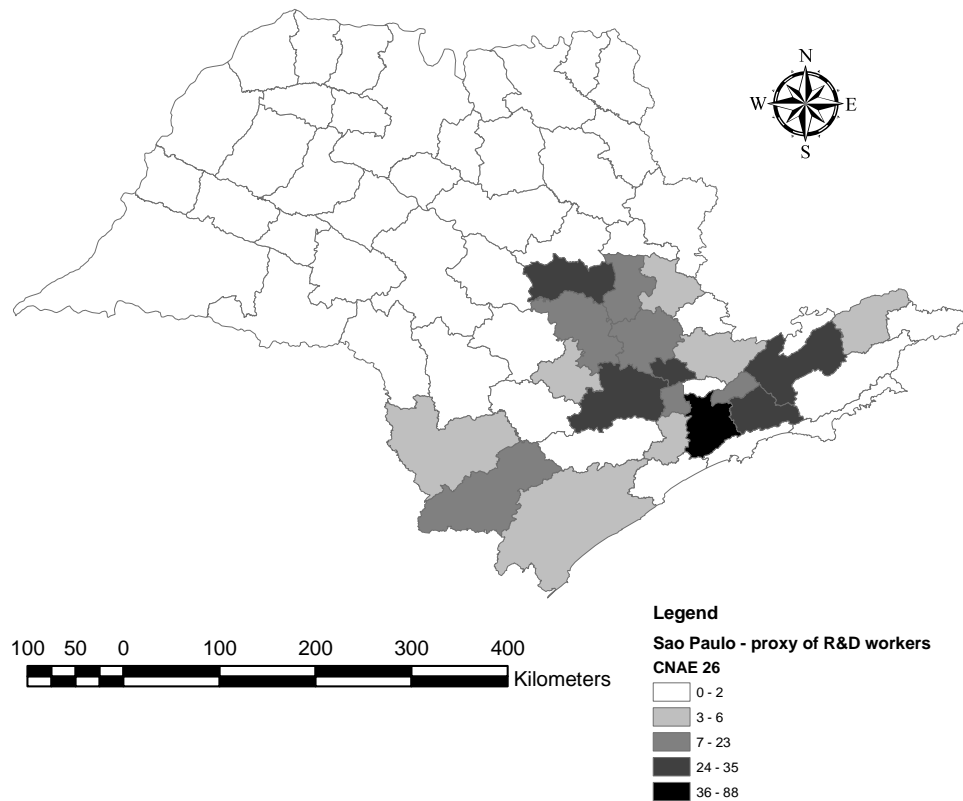
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



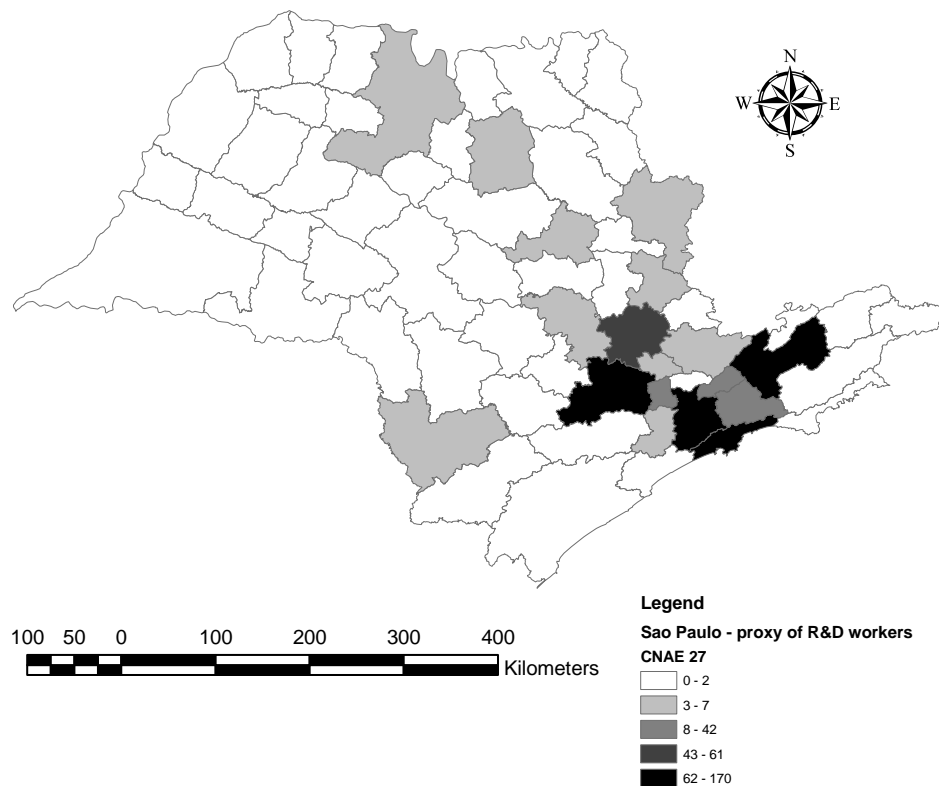
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



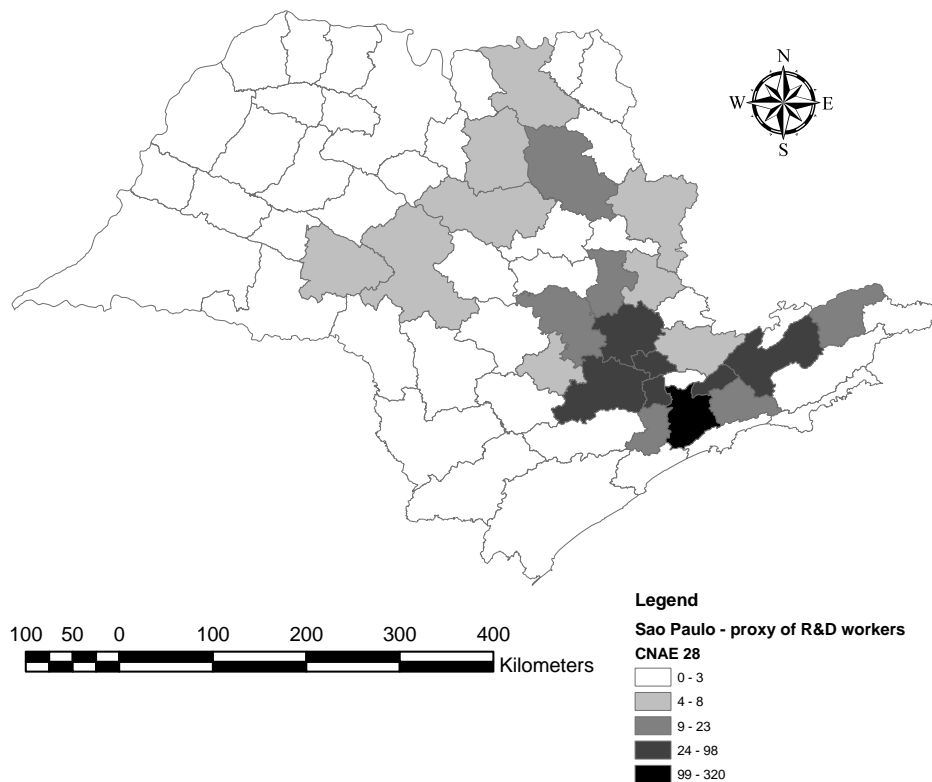
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



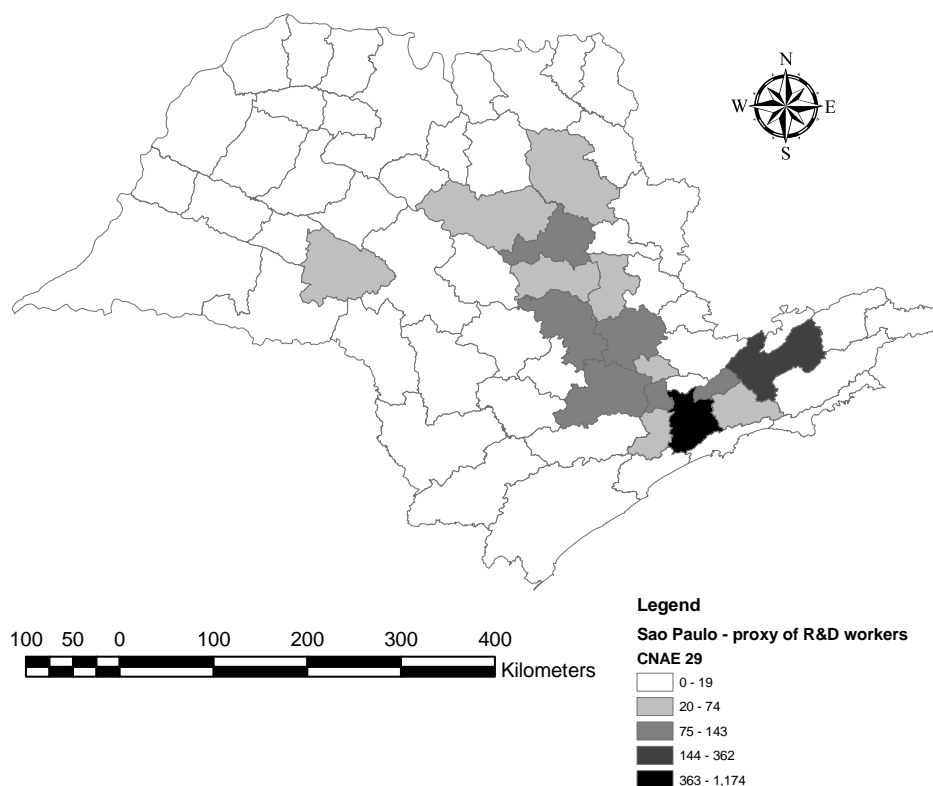
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



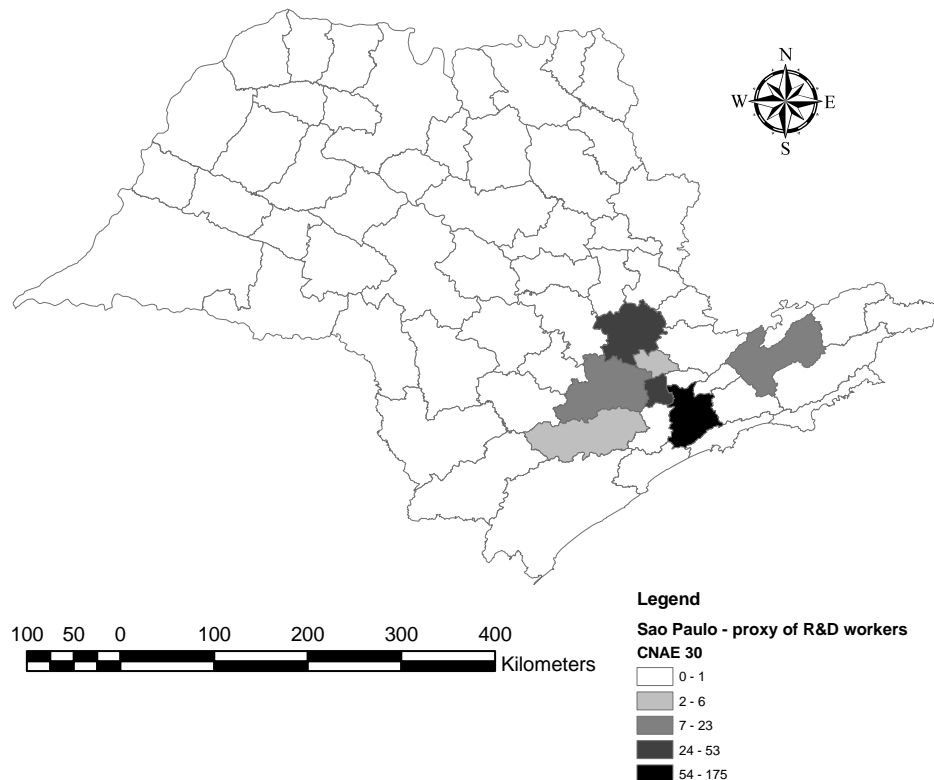
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



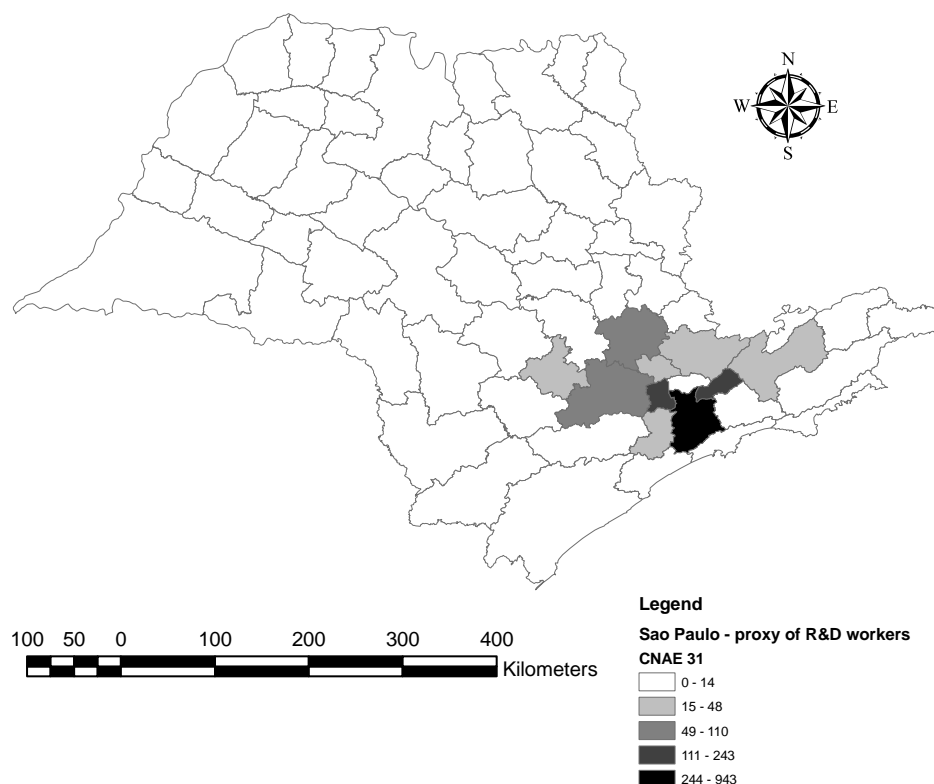
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting
and computing machinery)**



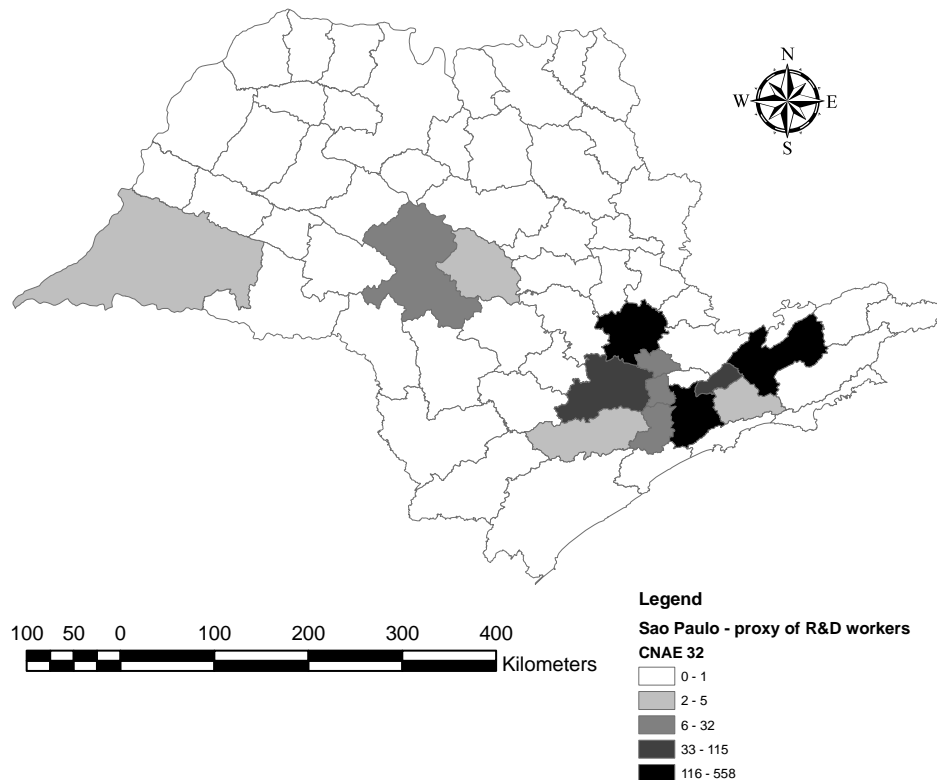
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



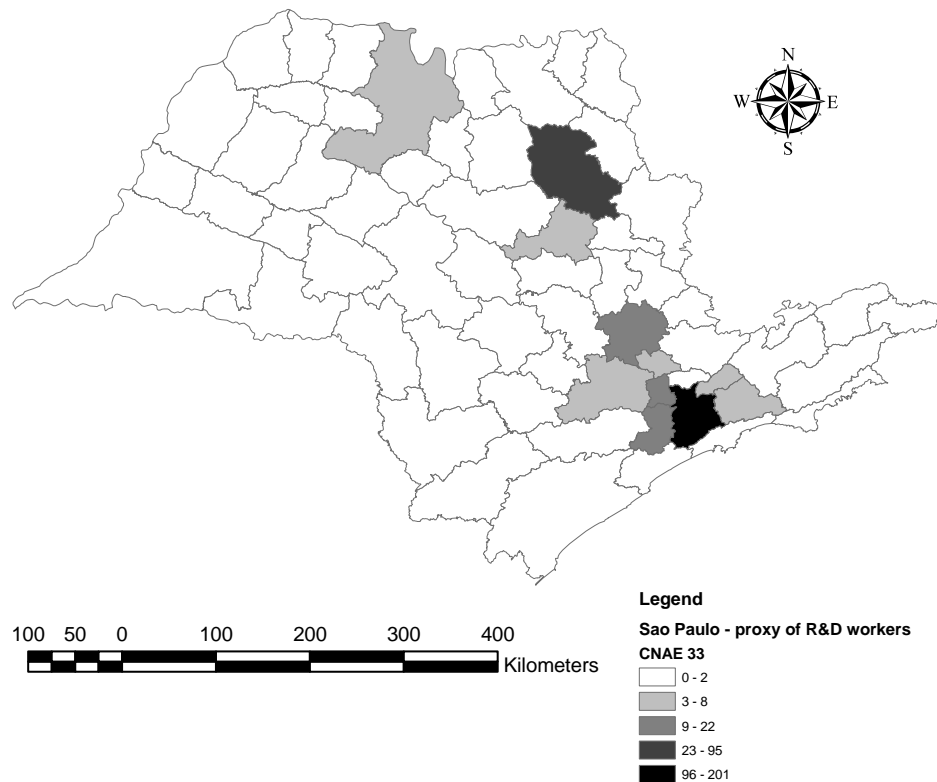
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television and
communication equipment and apparatus)**



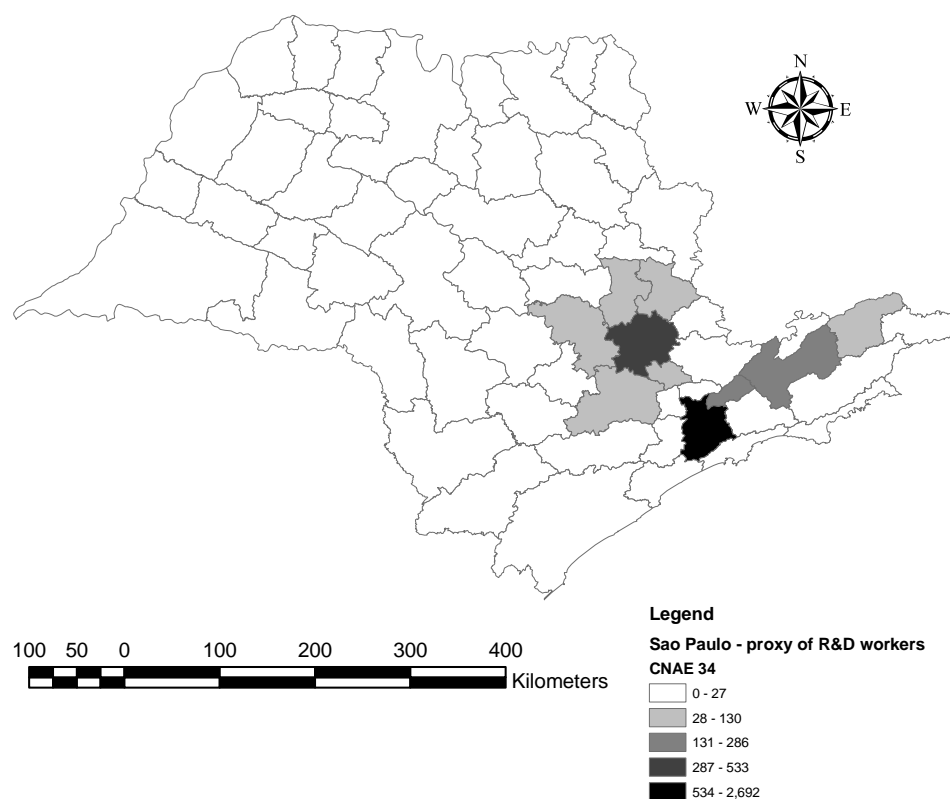
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)**



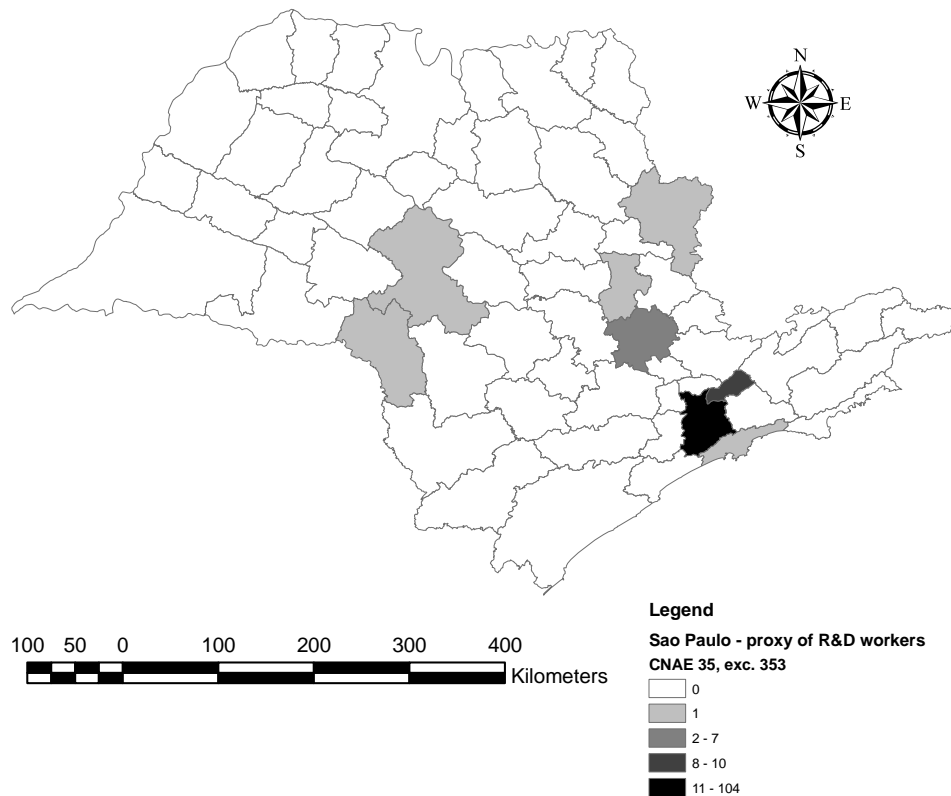
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



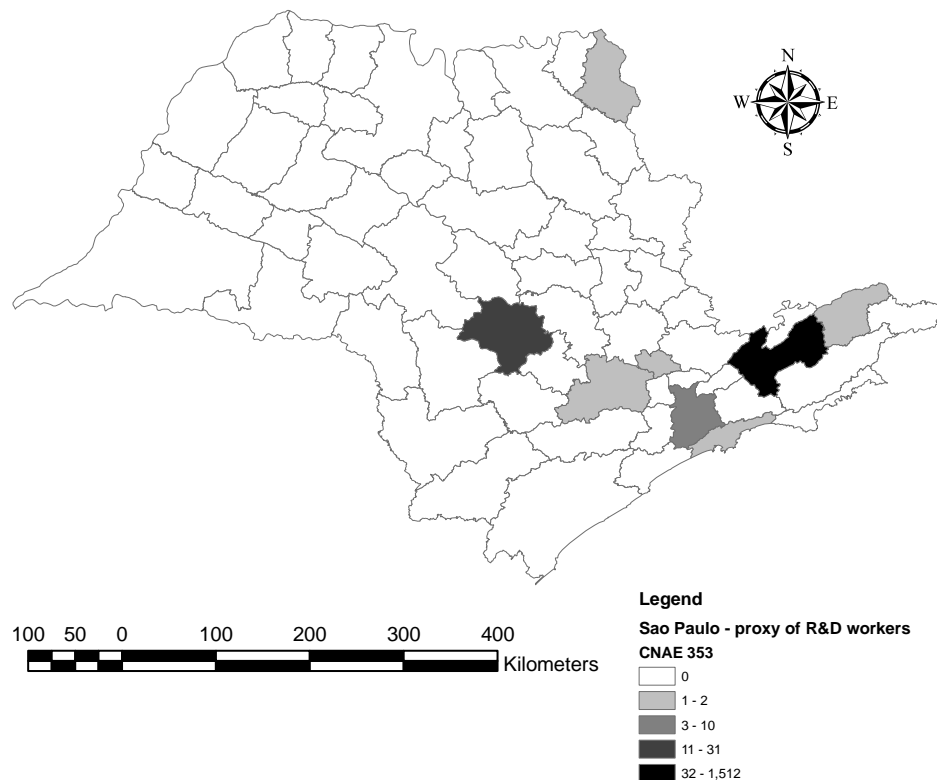
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



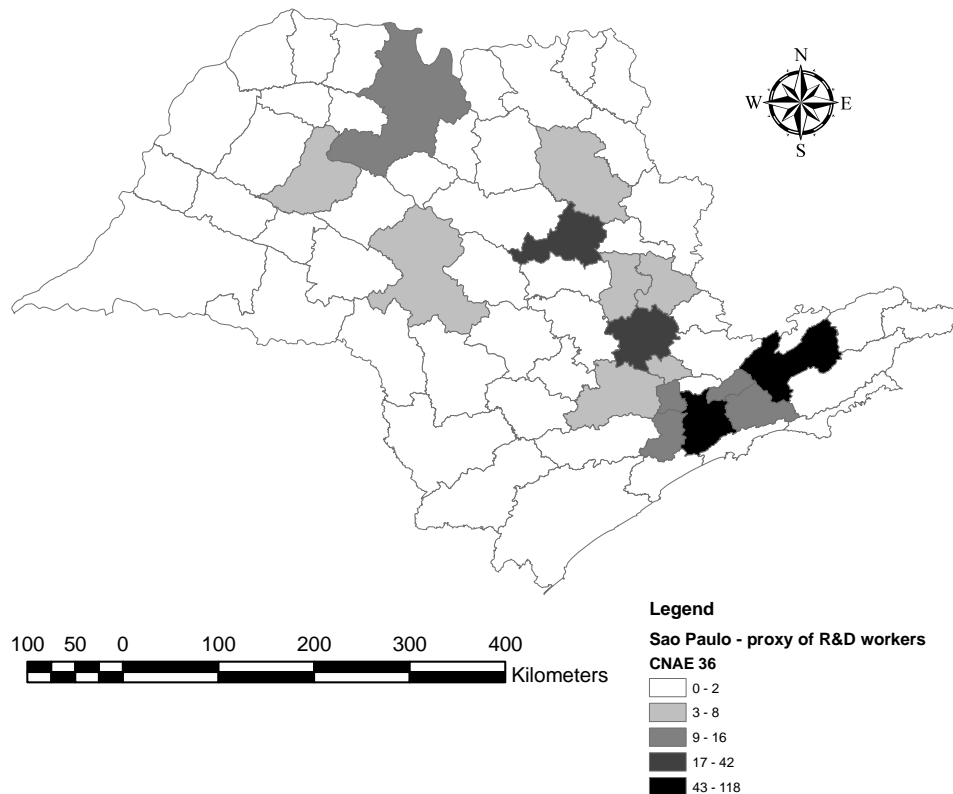
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



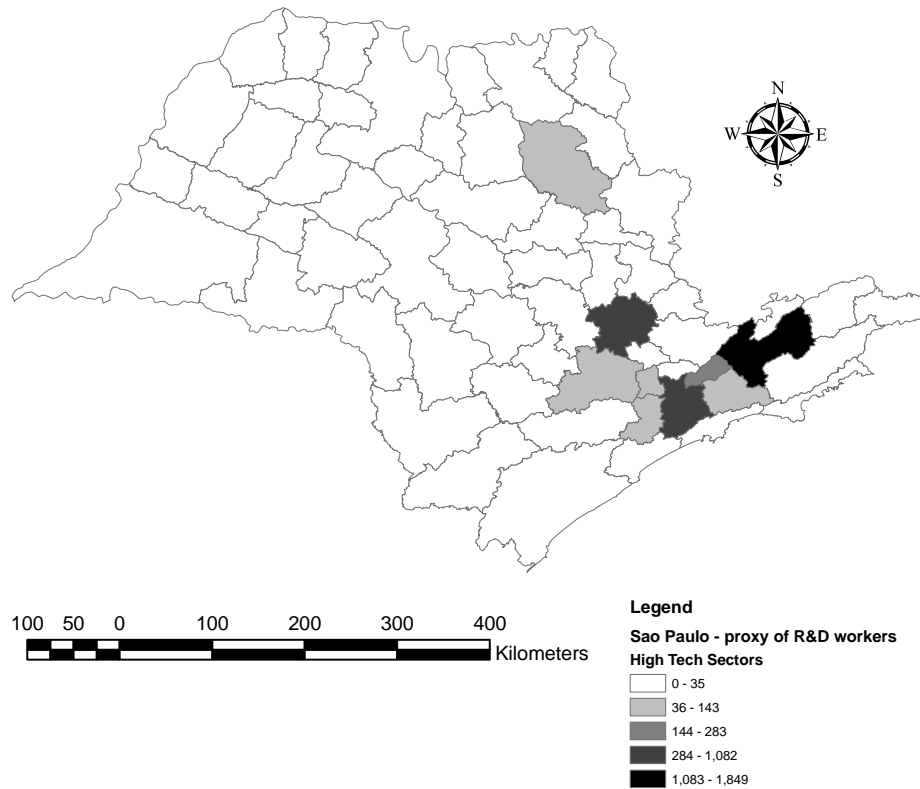
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

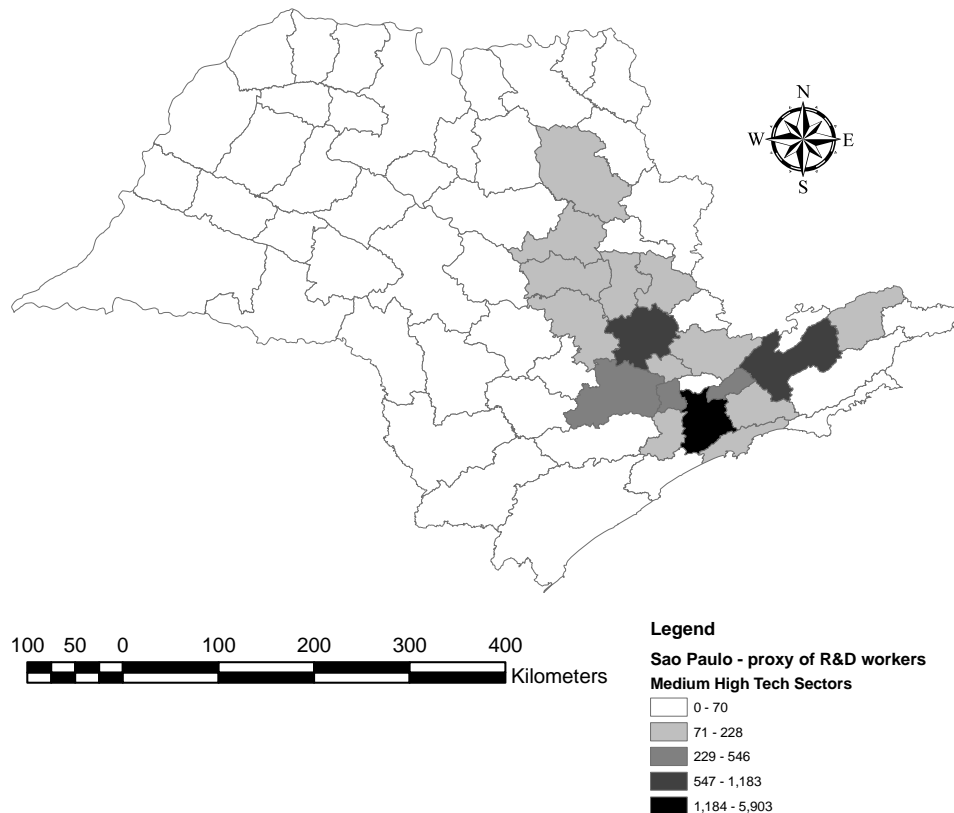
***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
High-Tech Sectors (1)***



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

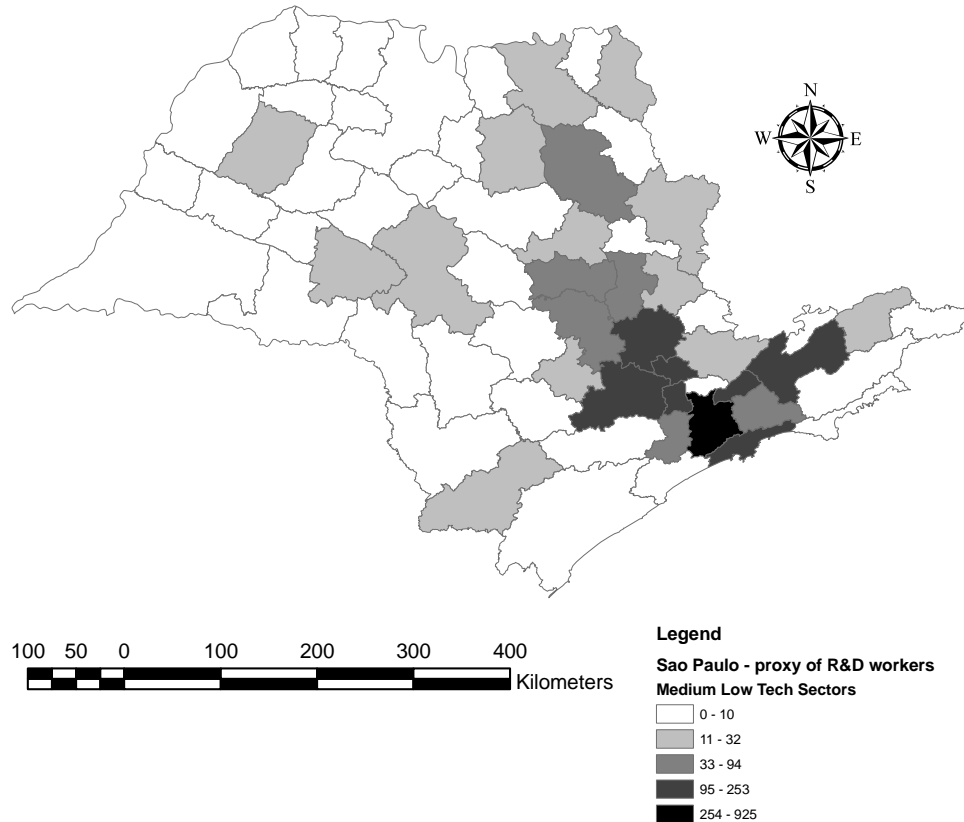
***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
Medium High-Tech Sectors (1)***



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

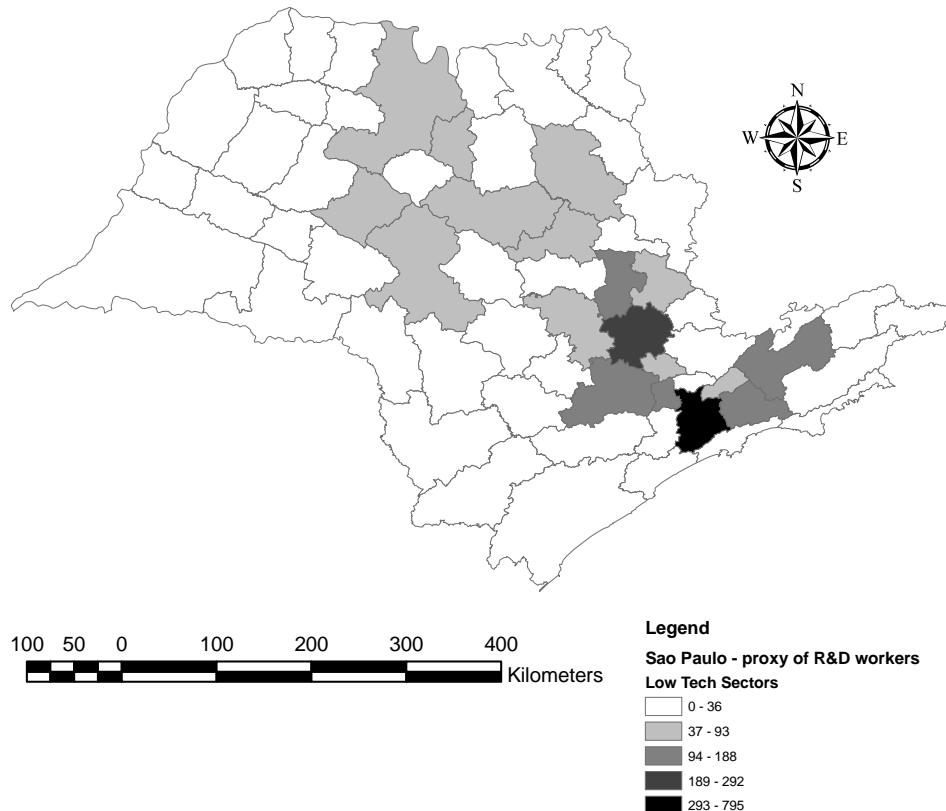
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

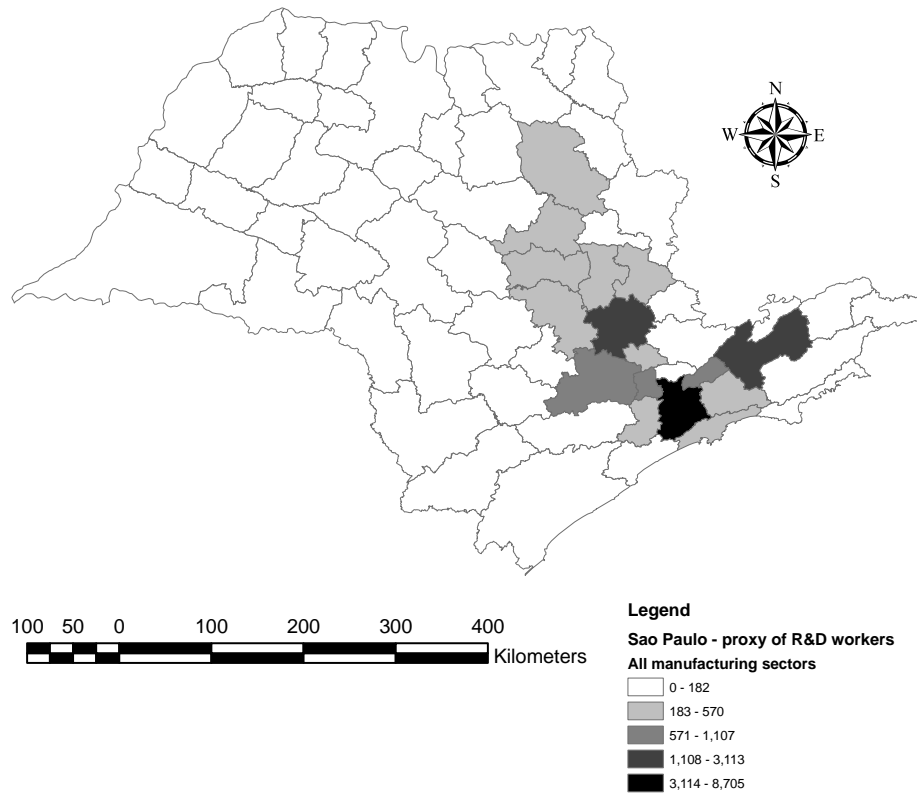
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
Low-Tech Sectors (1)**



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

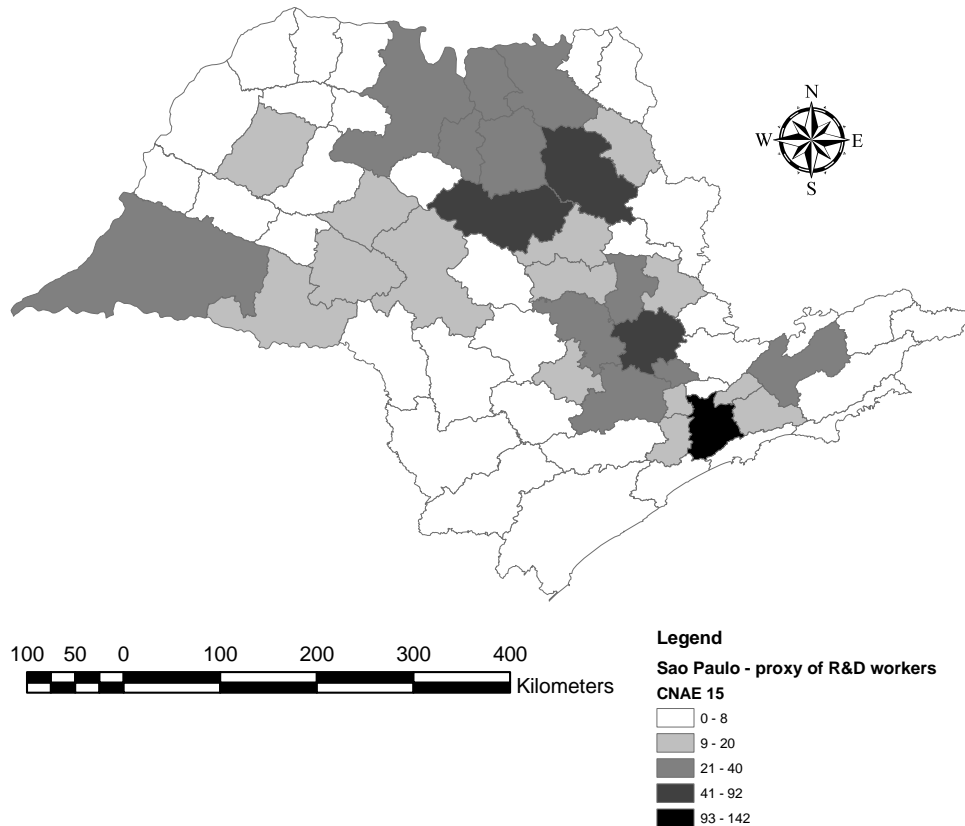
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2000
All manufacturing sectors***



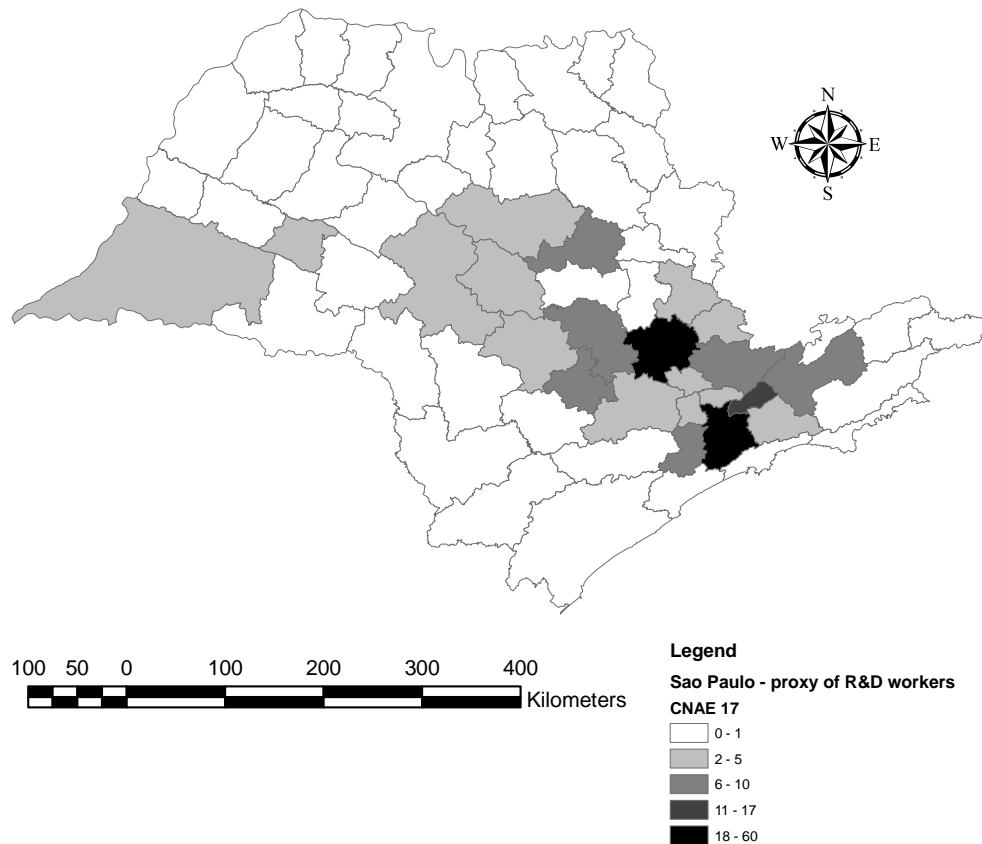
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)***



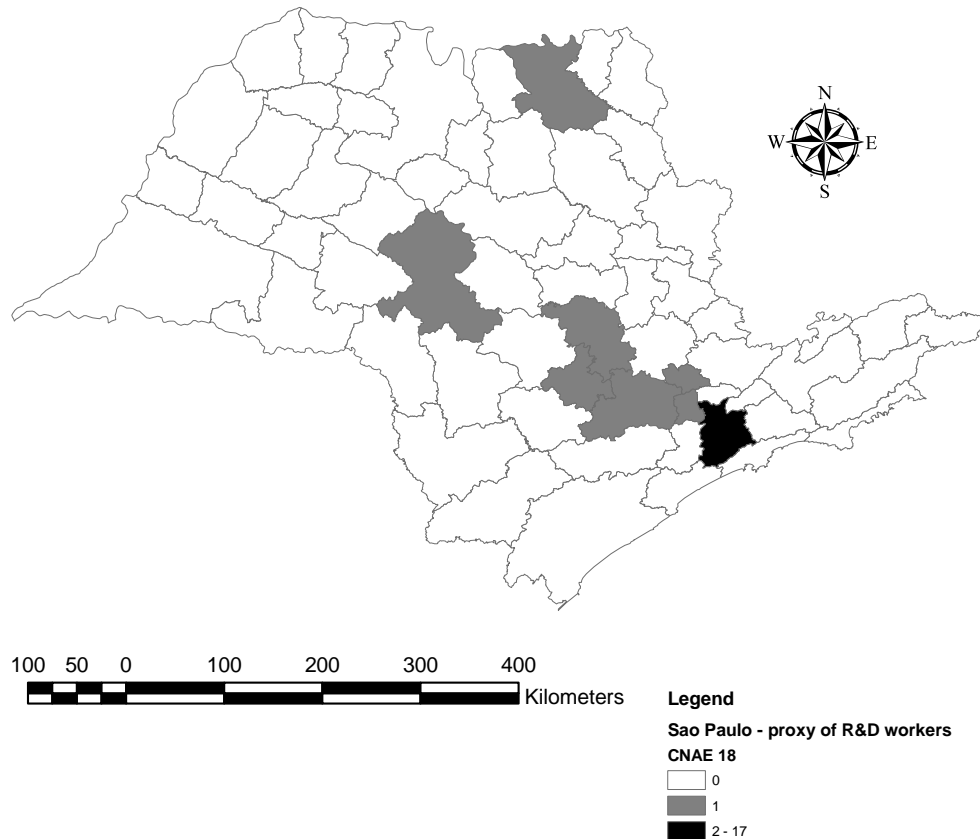
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



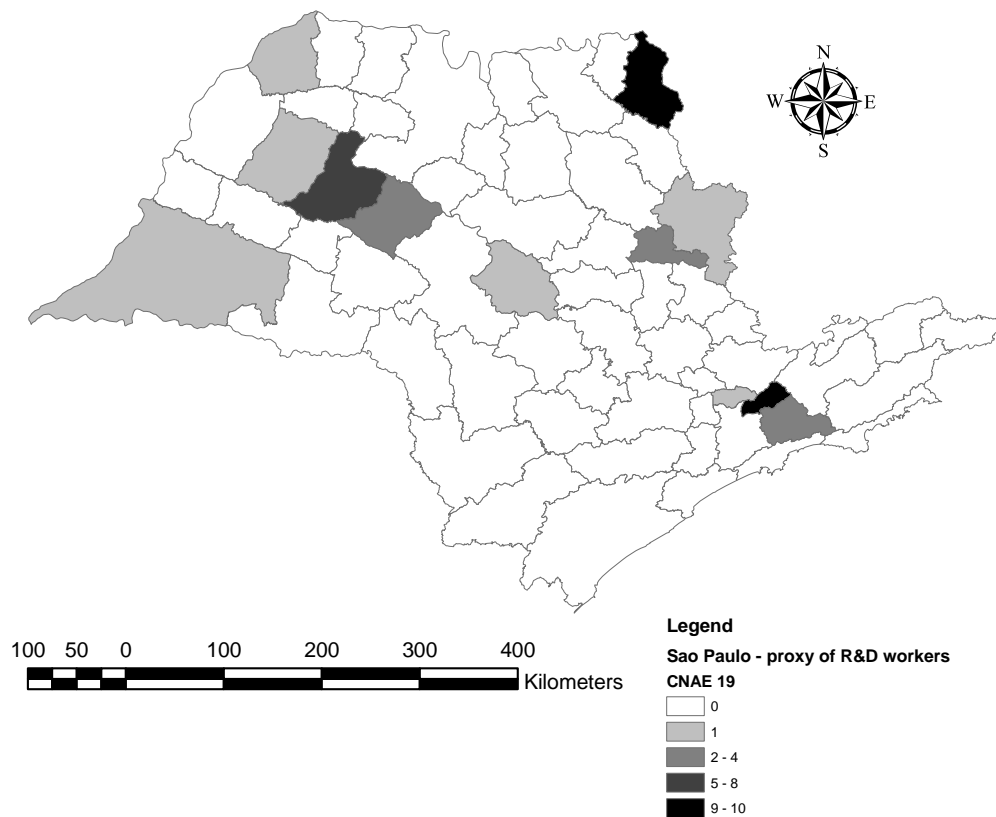
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)***



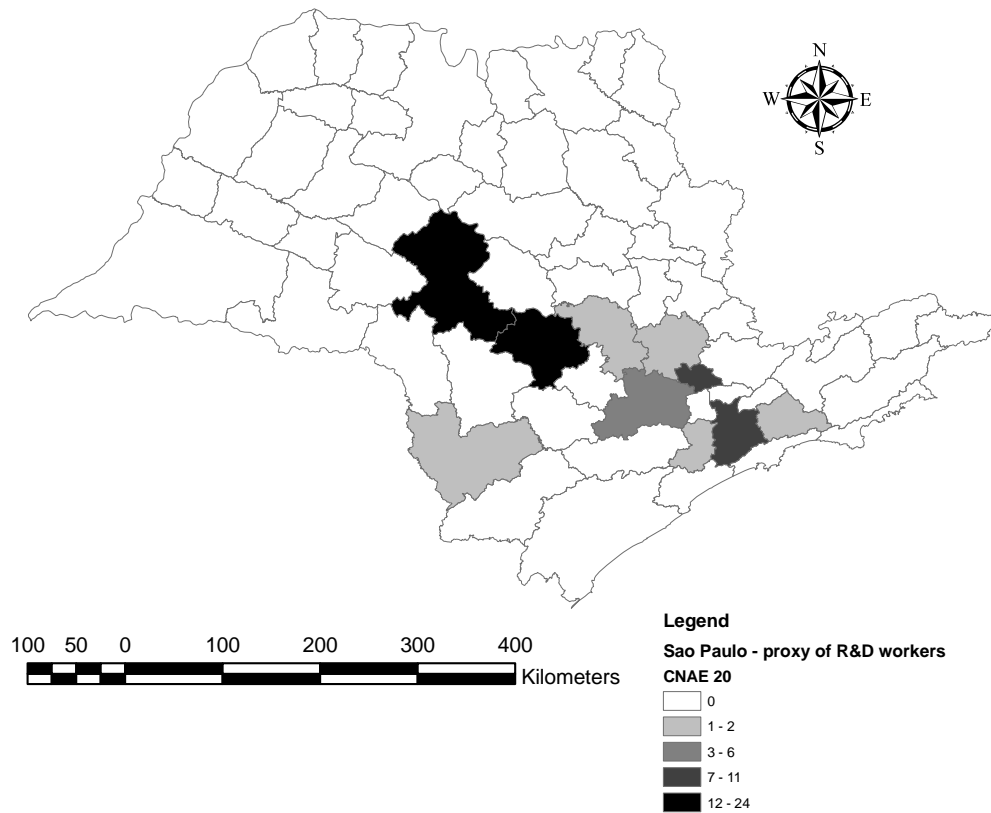
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



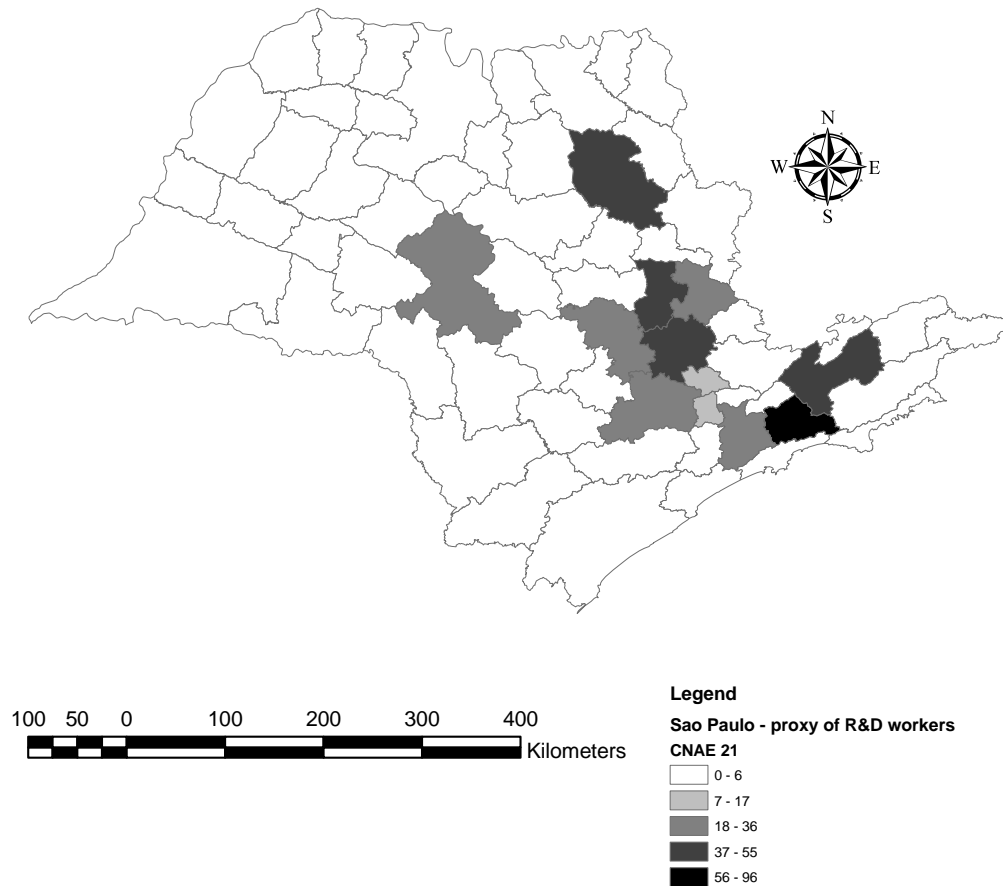
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)***



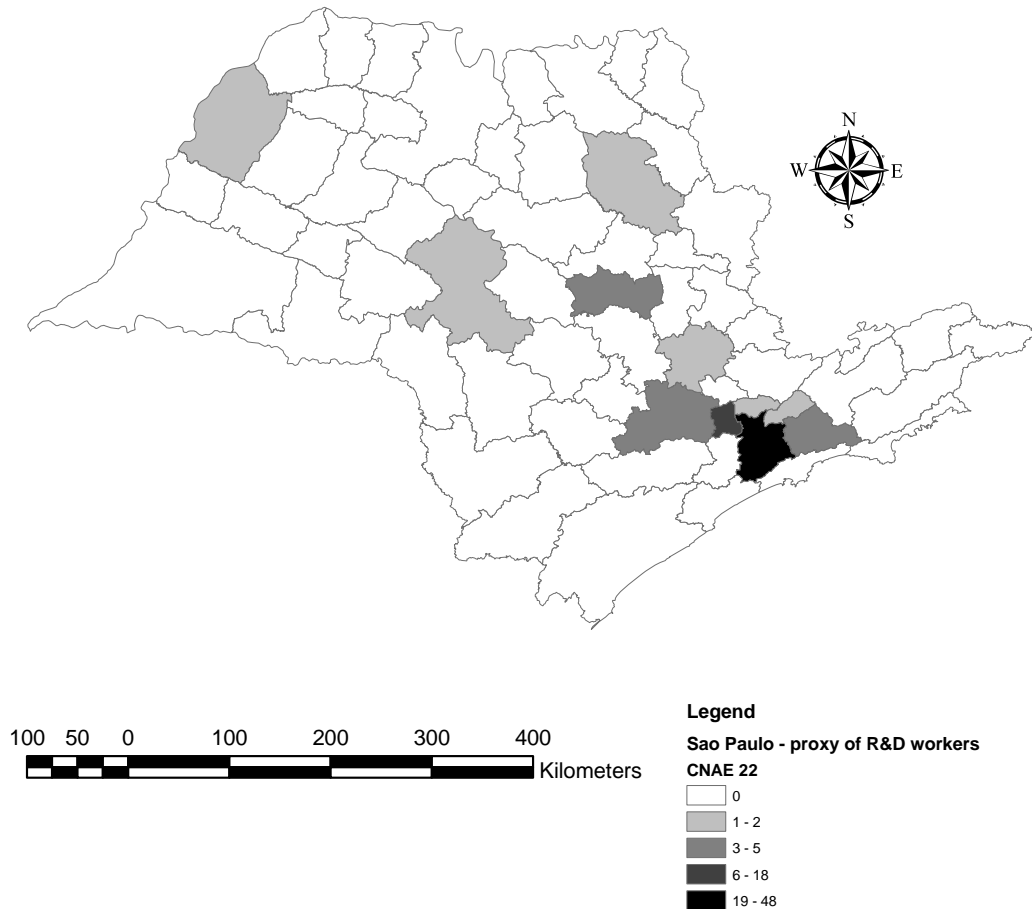
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)***



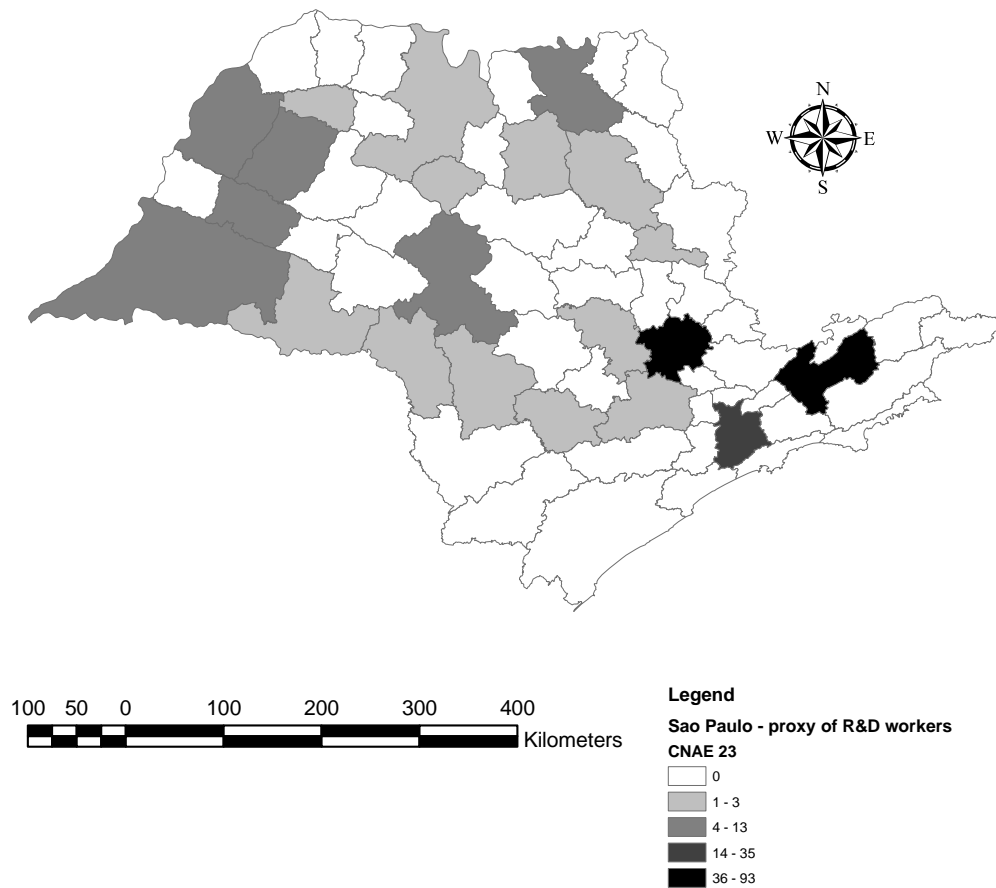
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



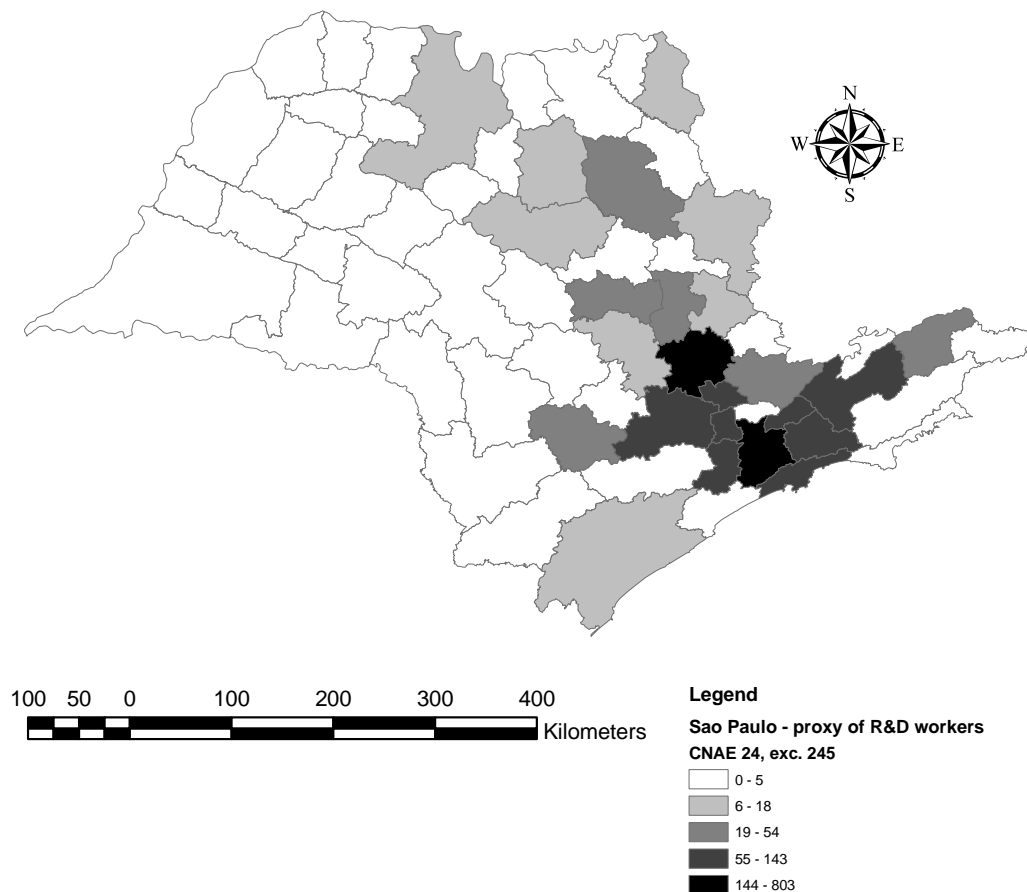
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)***



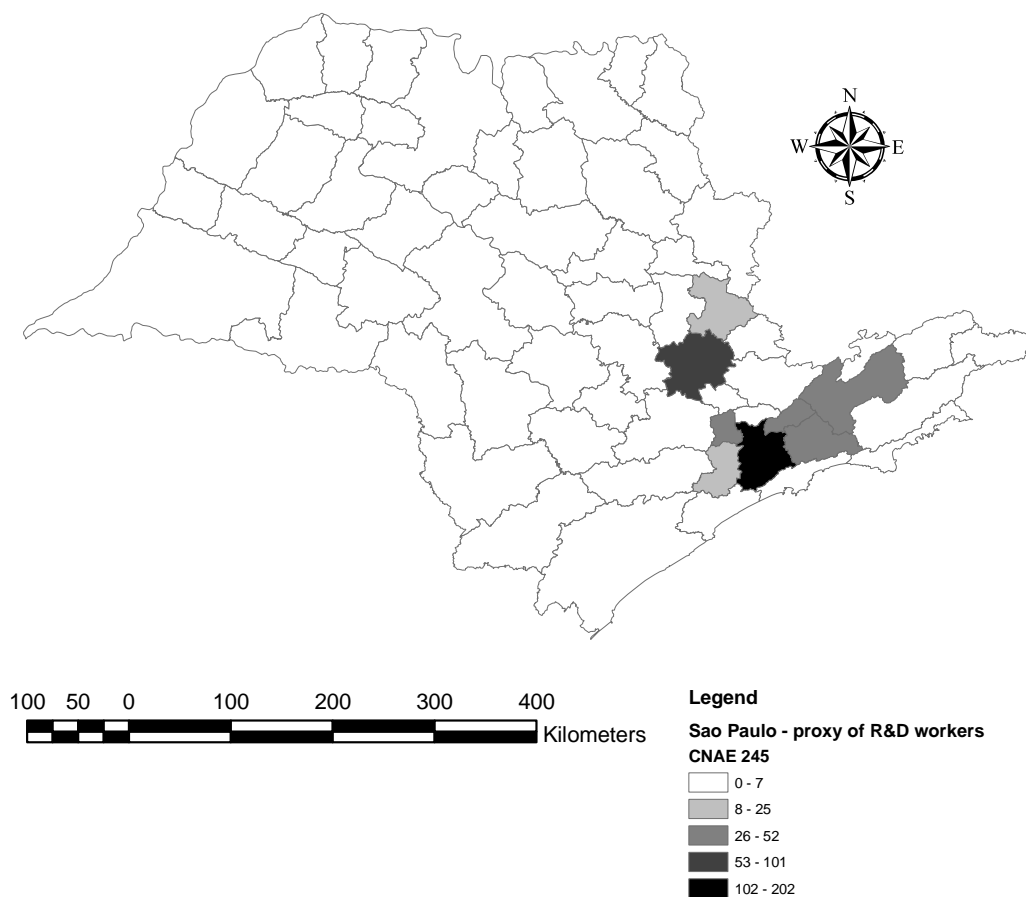
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 24, exc.
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



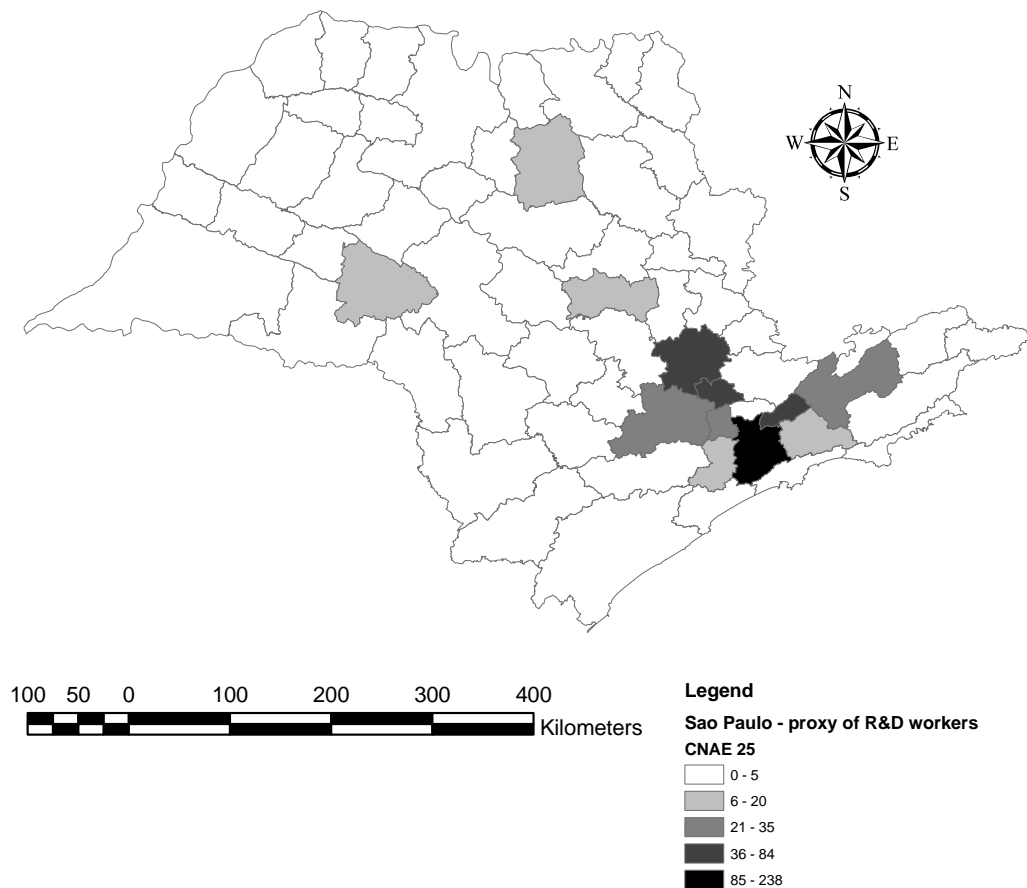
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



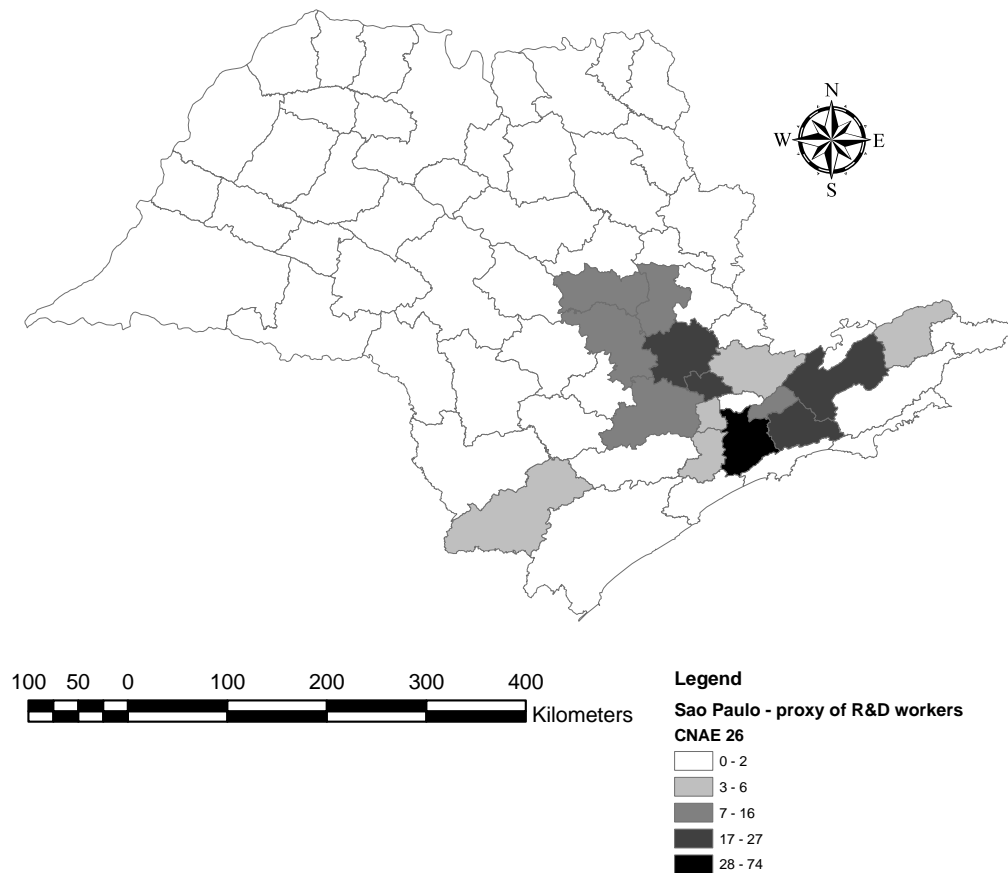
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



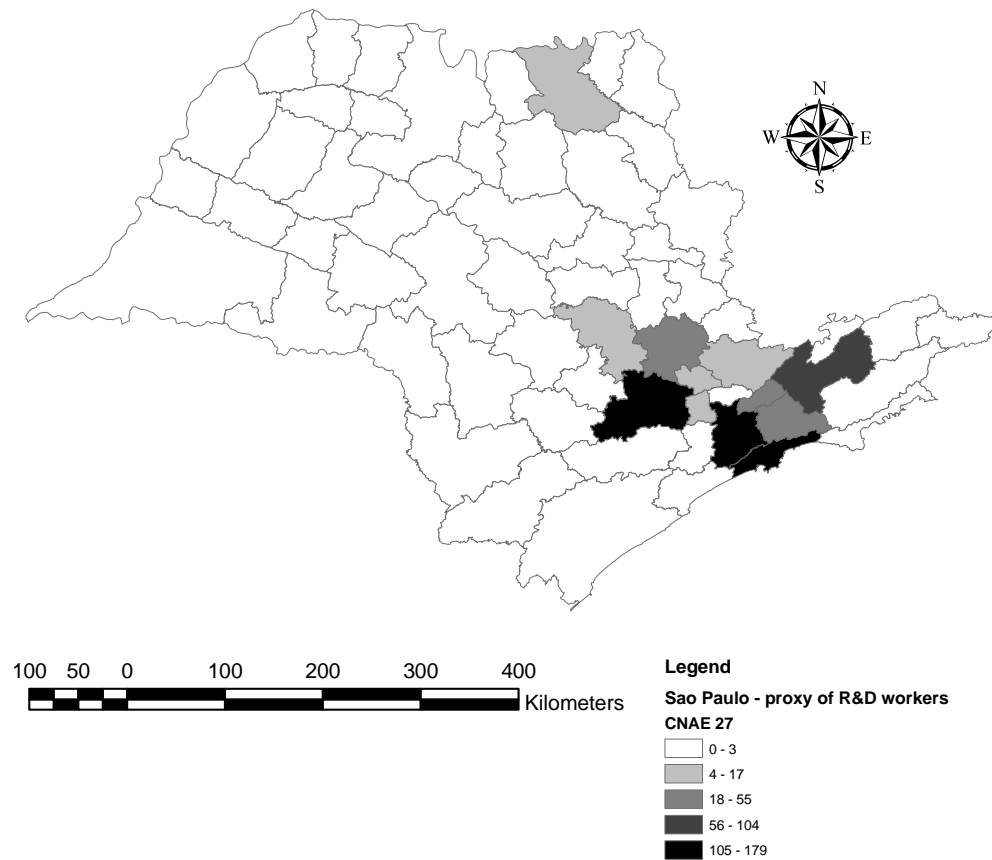
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



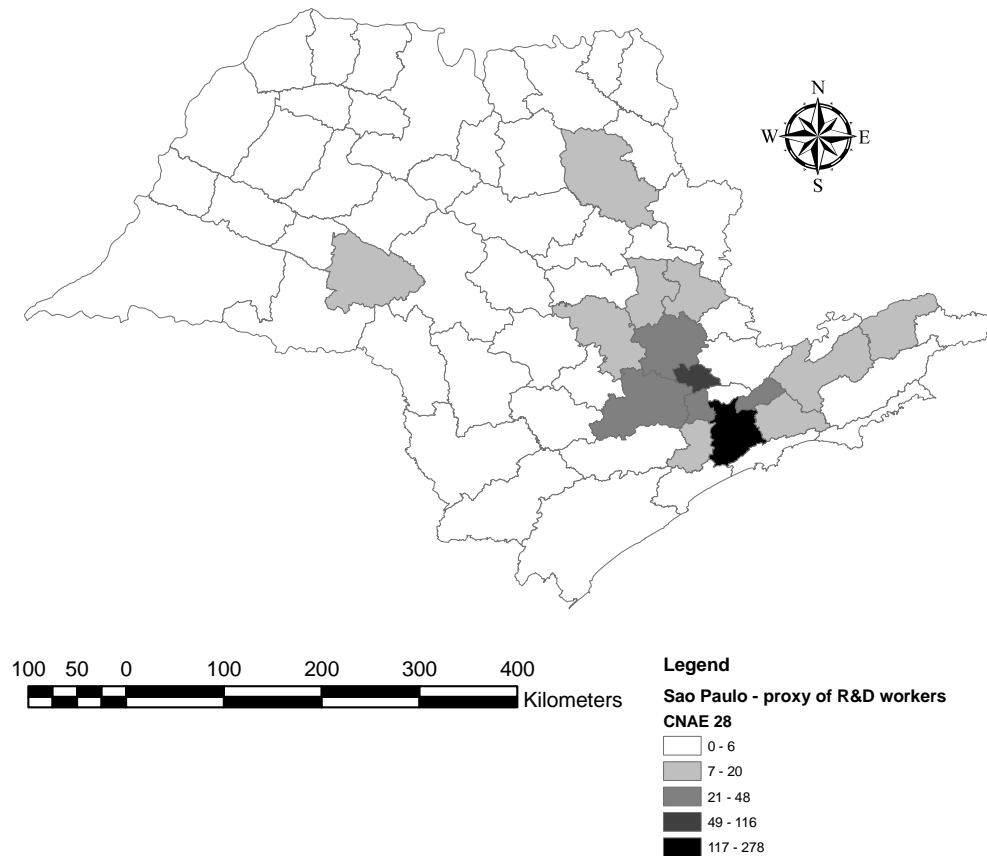
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)***



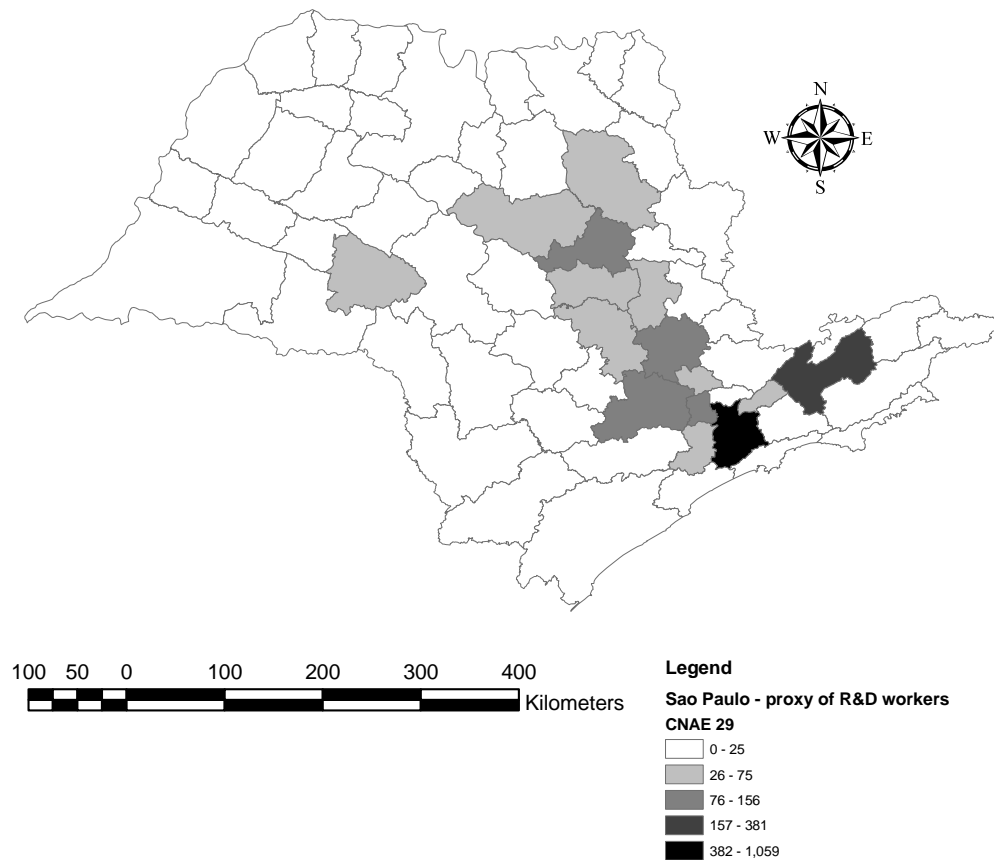
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)***



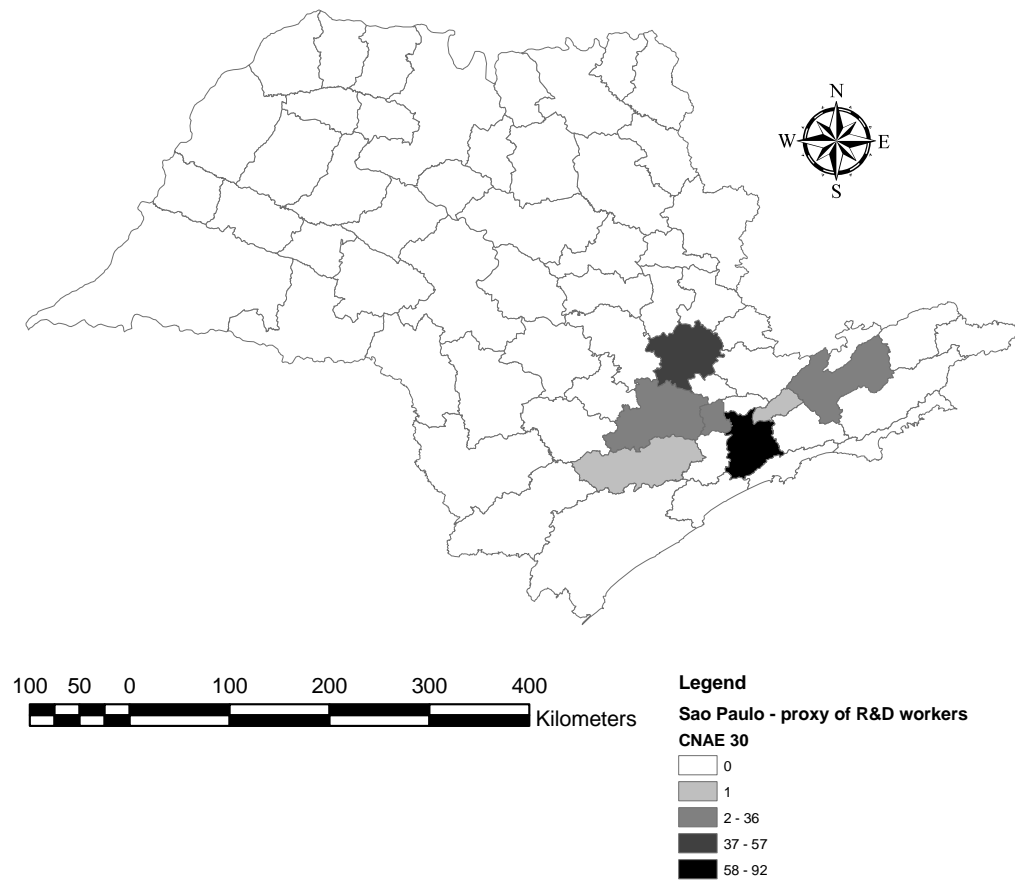
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



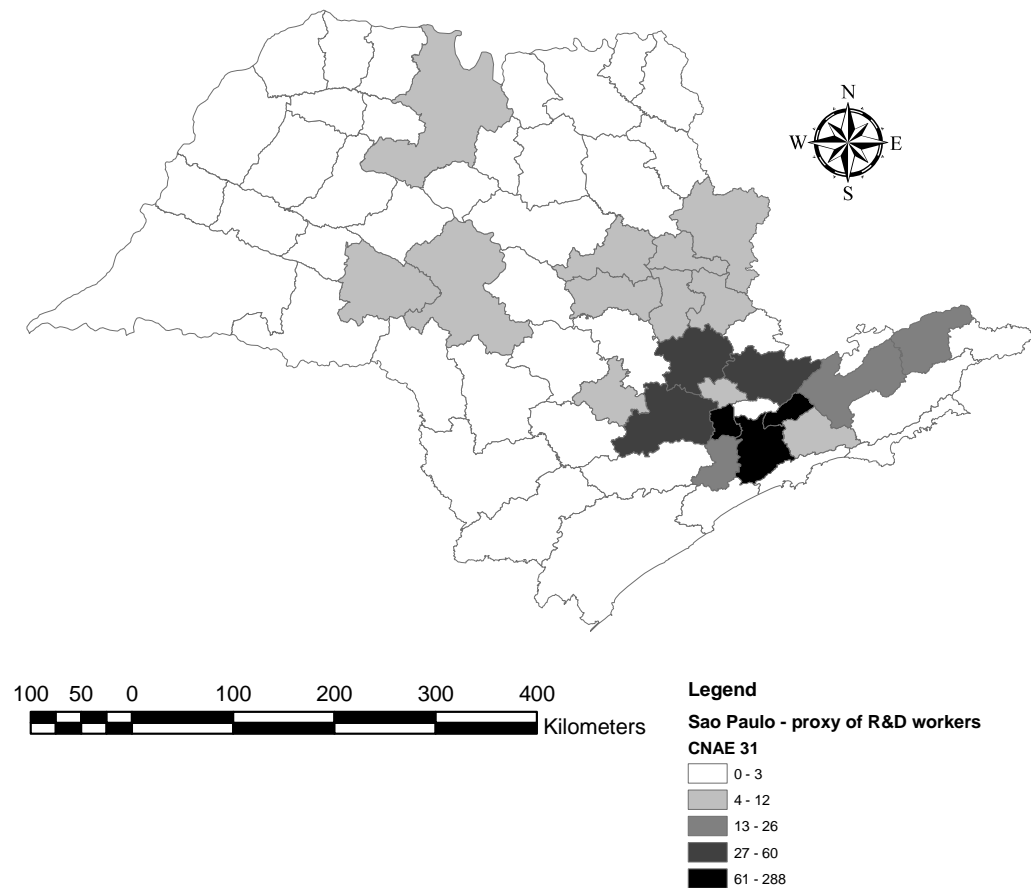
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting
and computing machinery)**



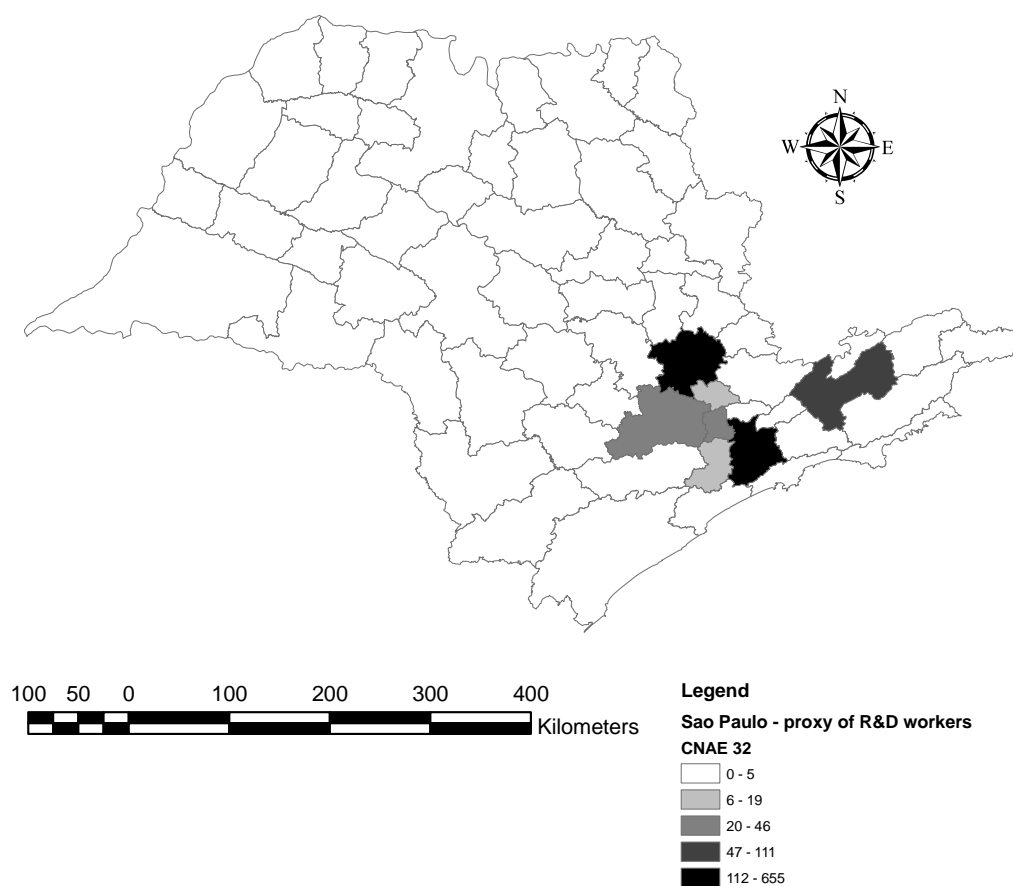
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c)**



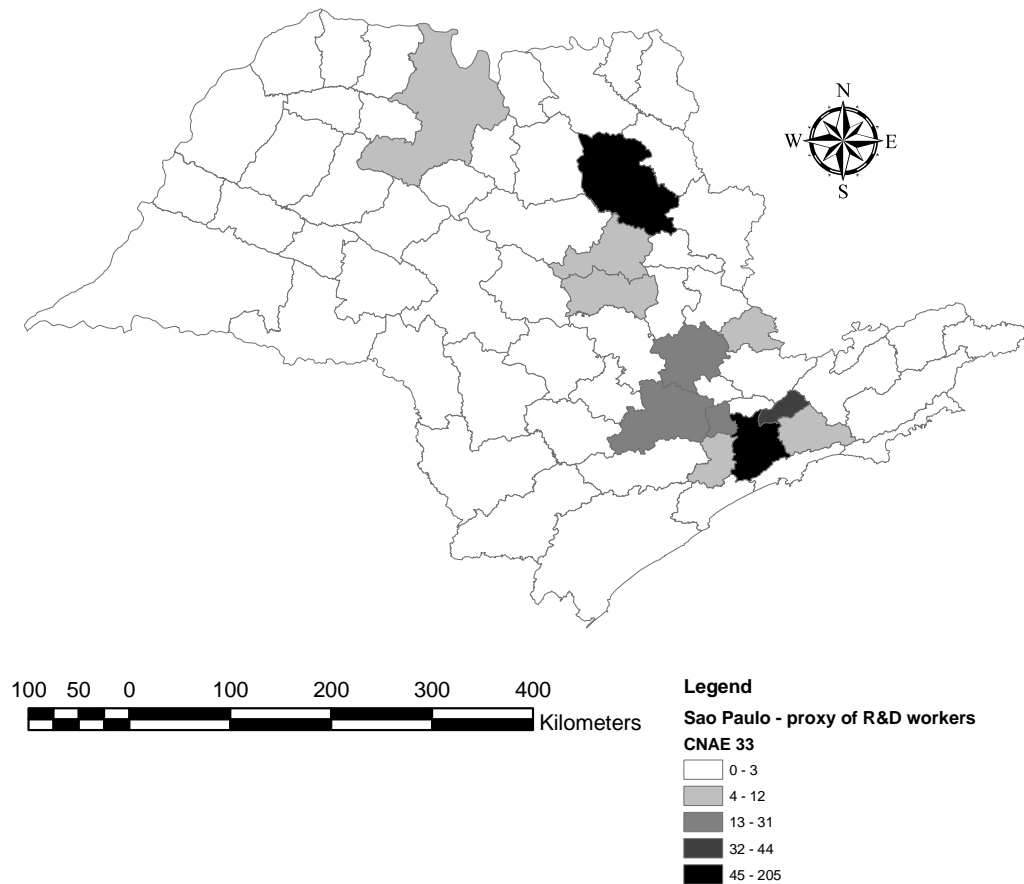
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television
and communication equipment and apparatus)**



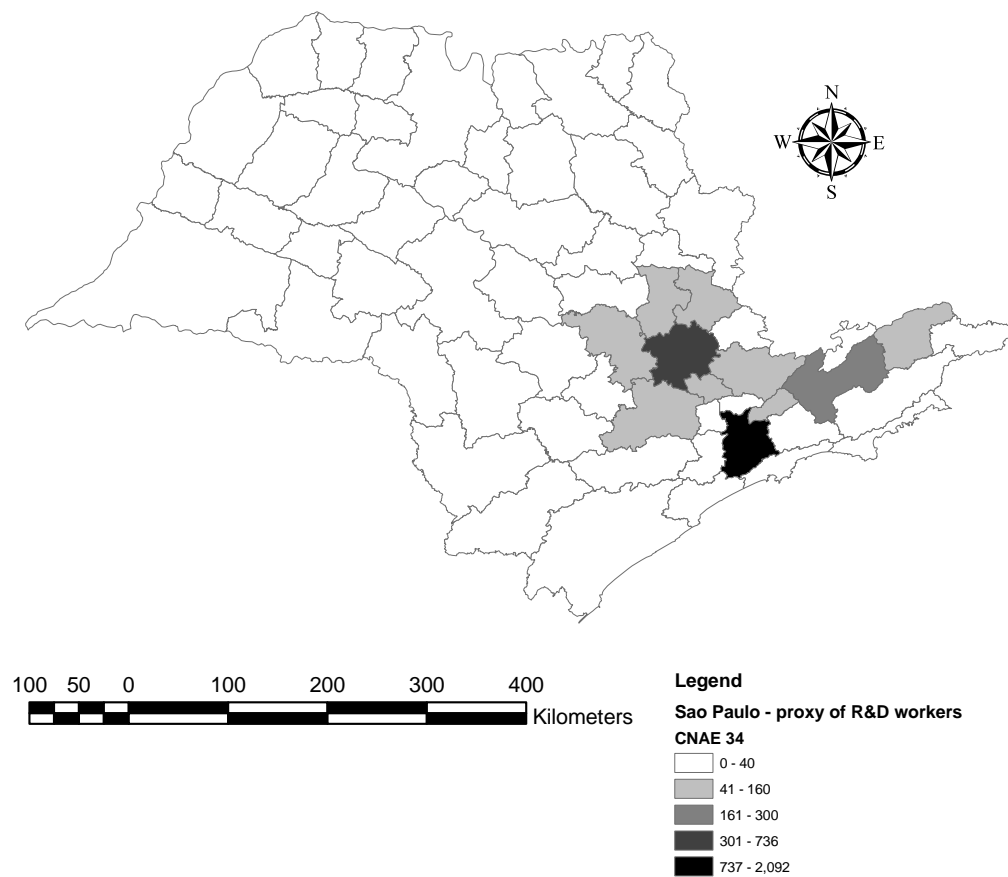
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)**



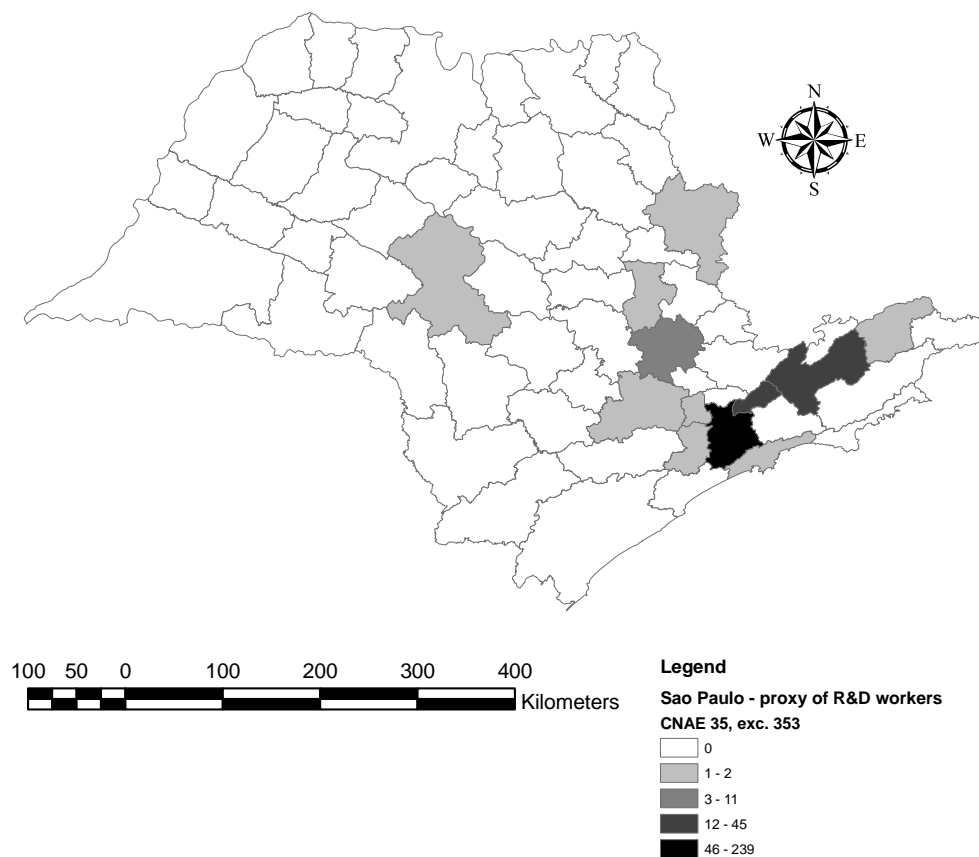
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



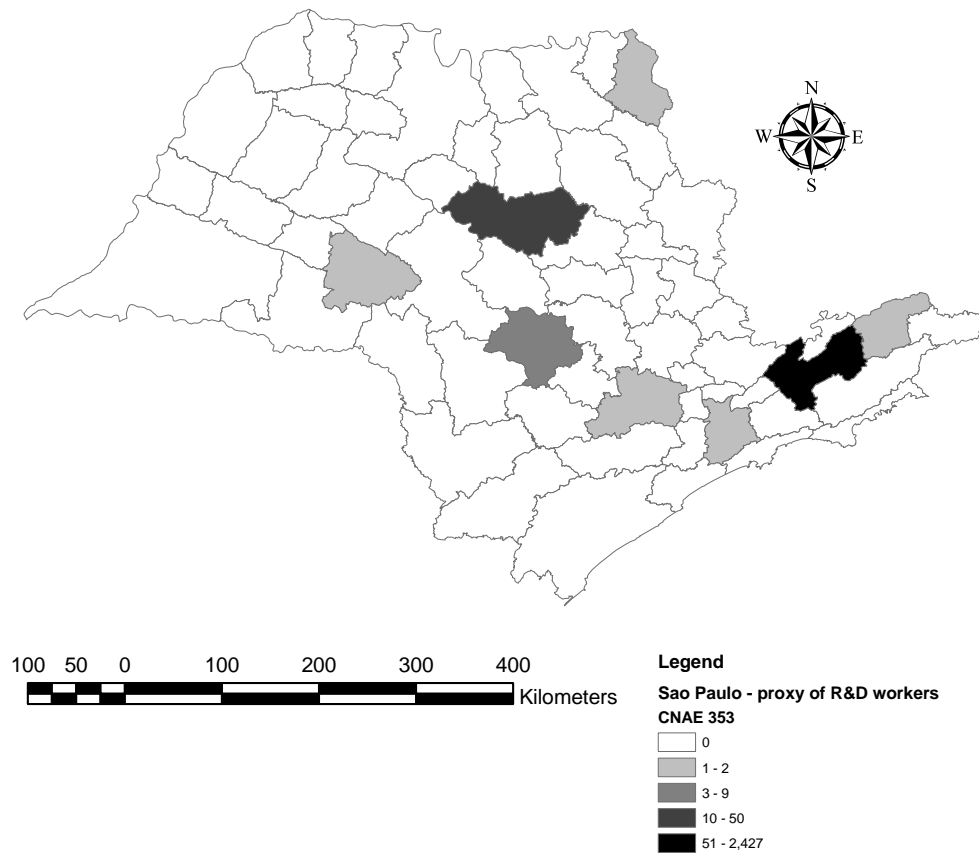
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)**



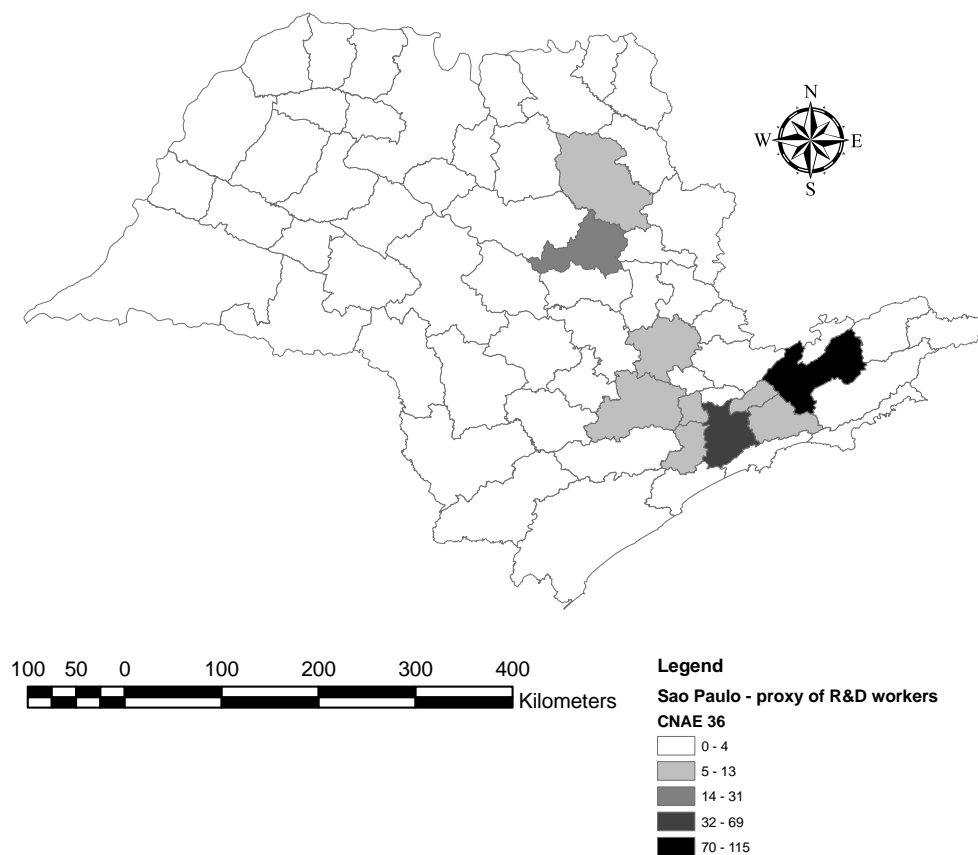
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)***



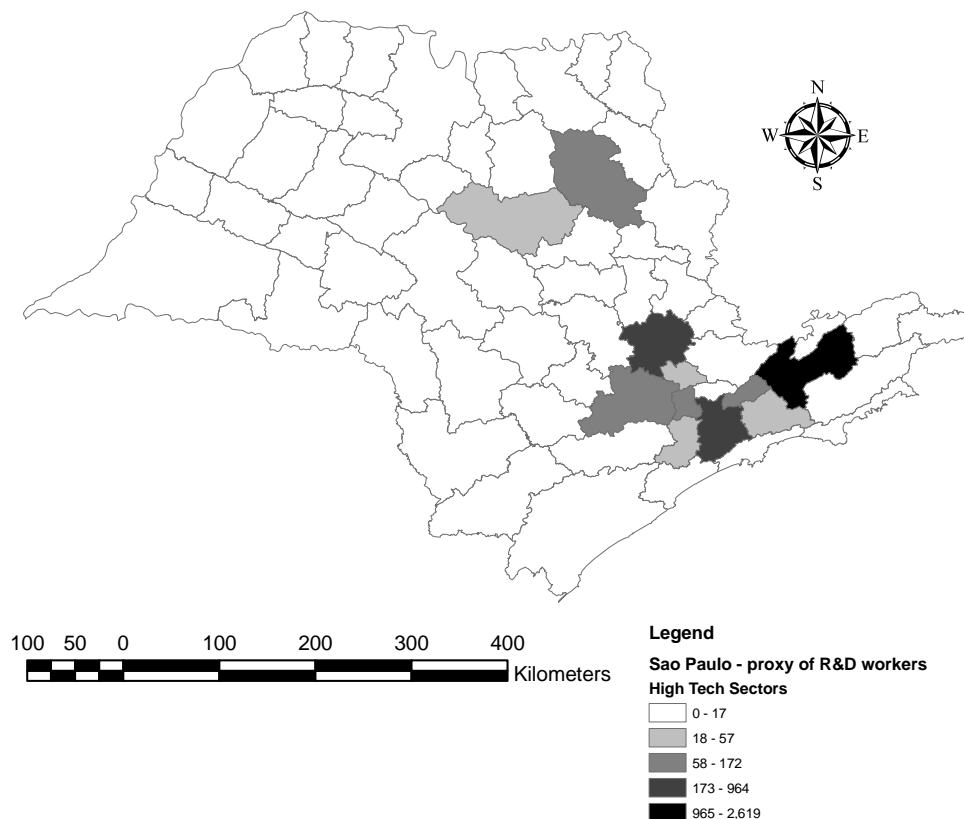
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

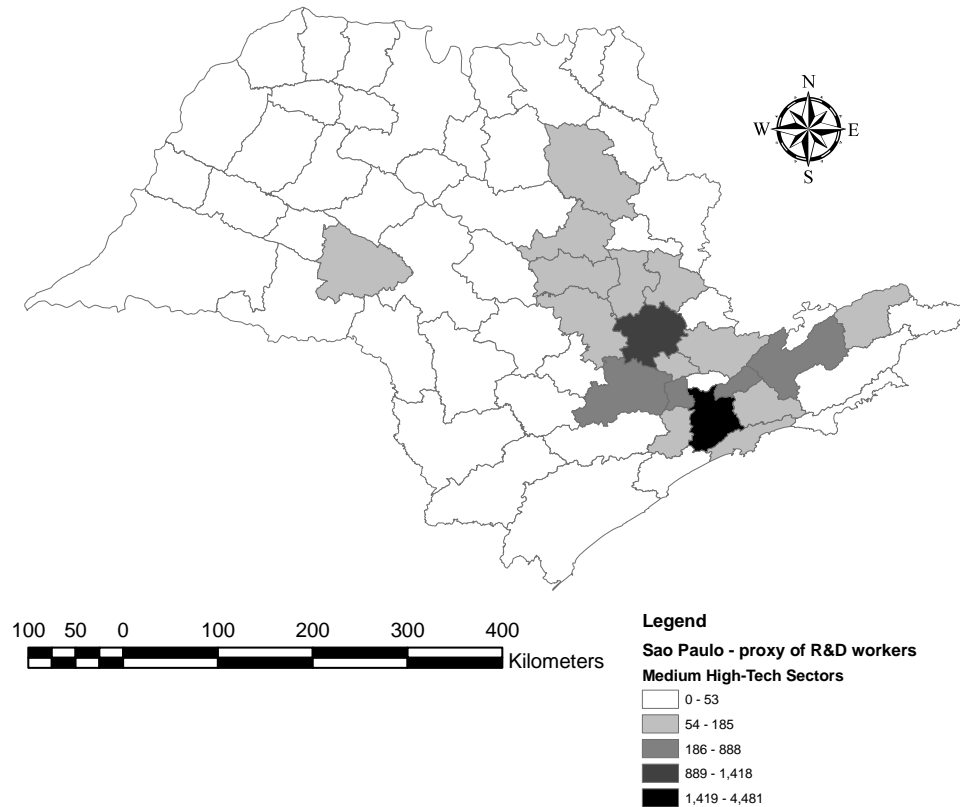
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
High-Tech Sectors (1)**



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery; Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

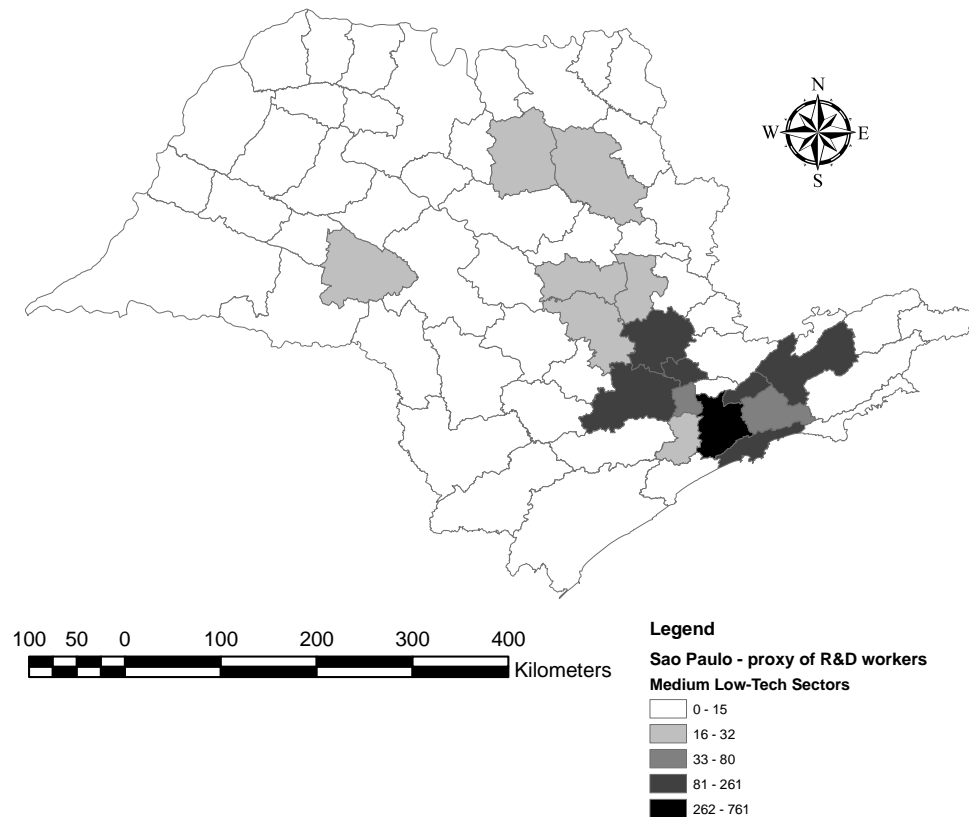
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
Medium High-Tech Sectors (1)**



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

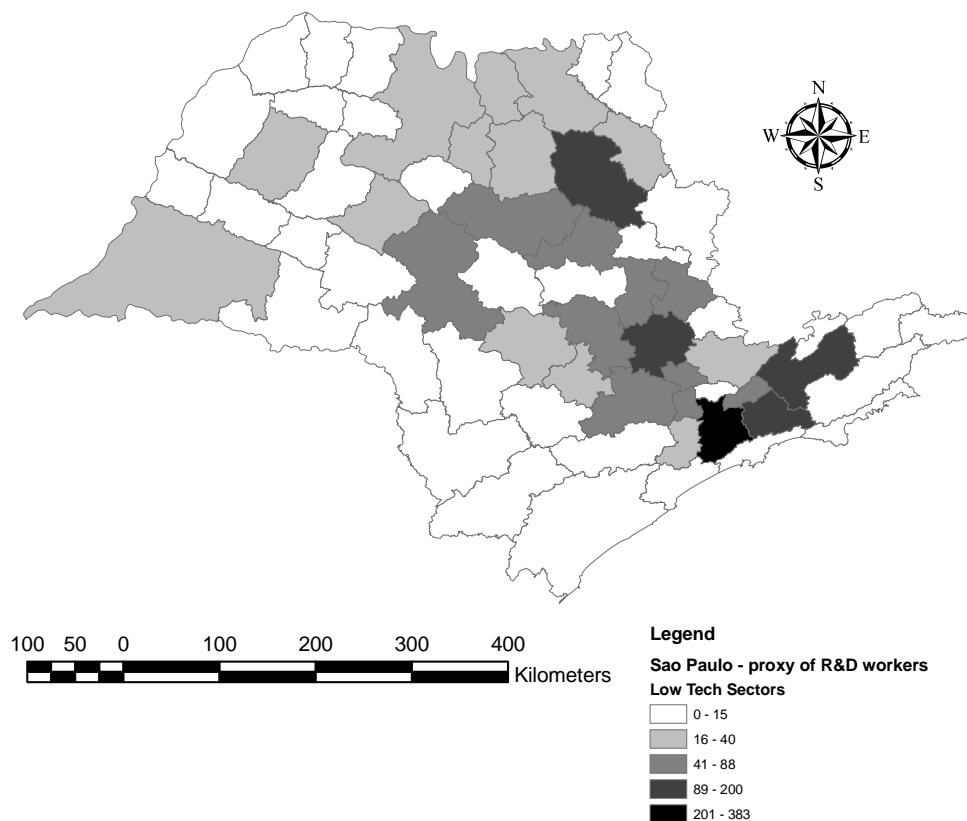
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
Medium Low-Tech Sectors (1)**



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

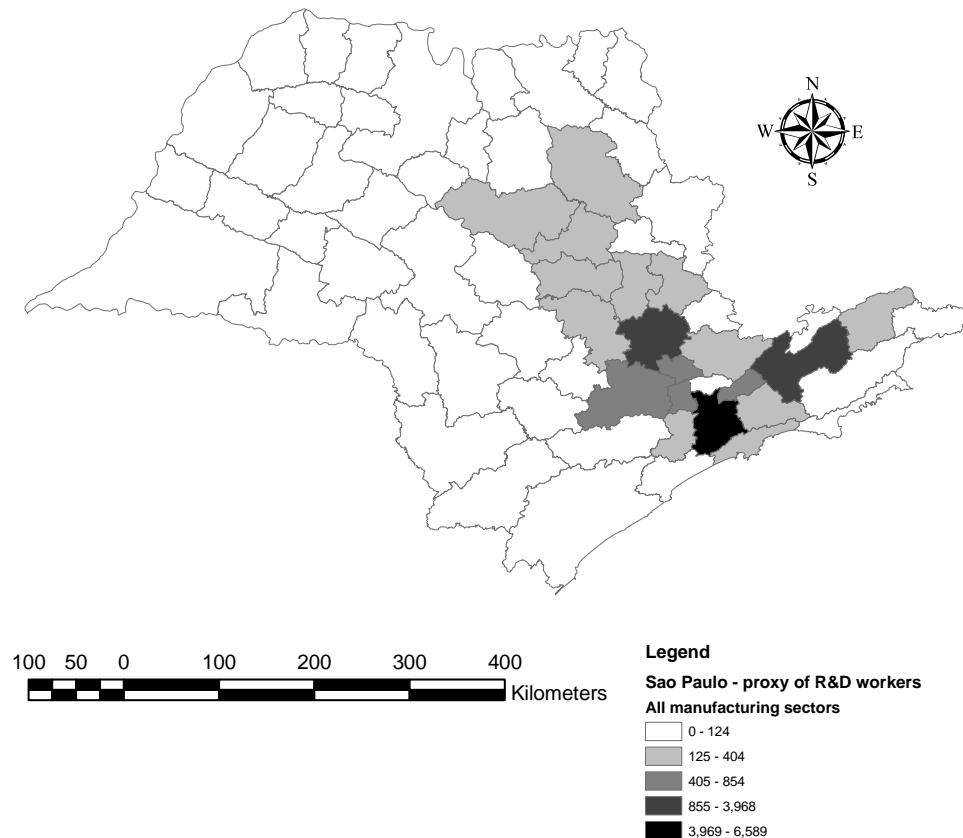
**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
Low-Tech Sectors (1)**



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

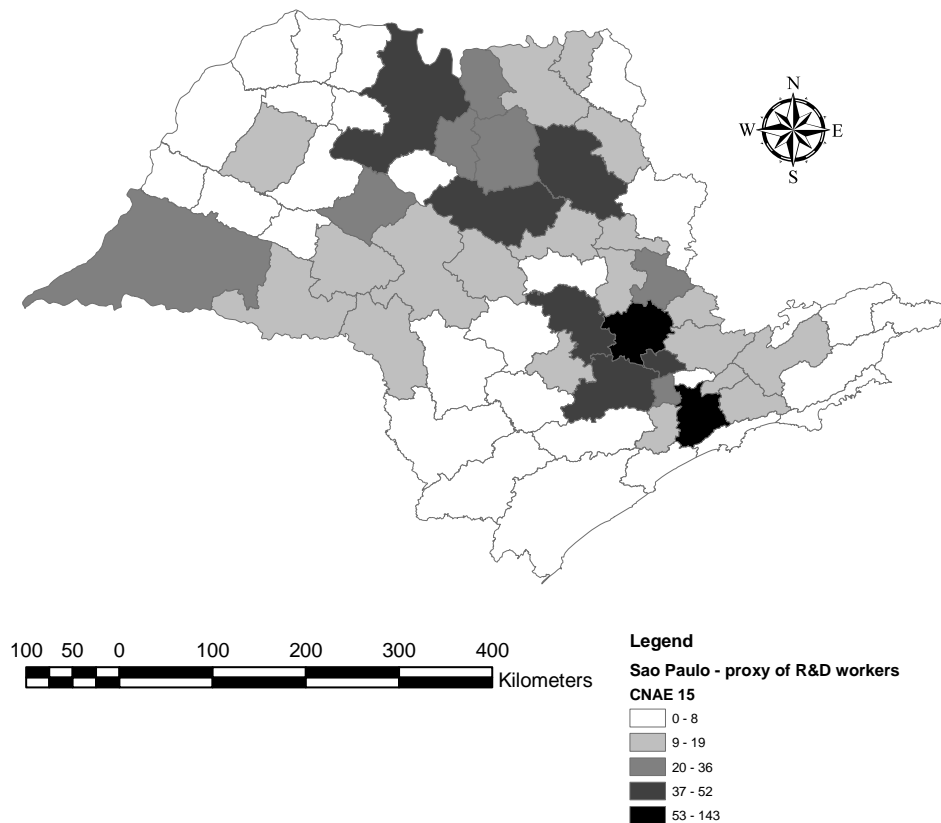
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2003
All manufacturing sectors***



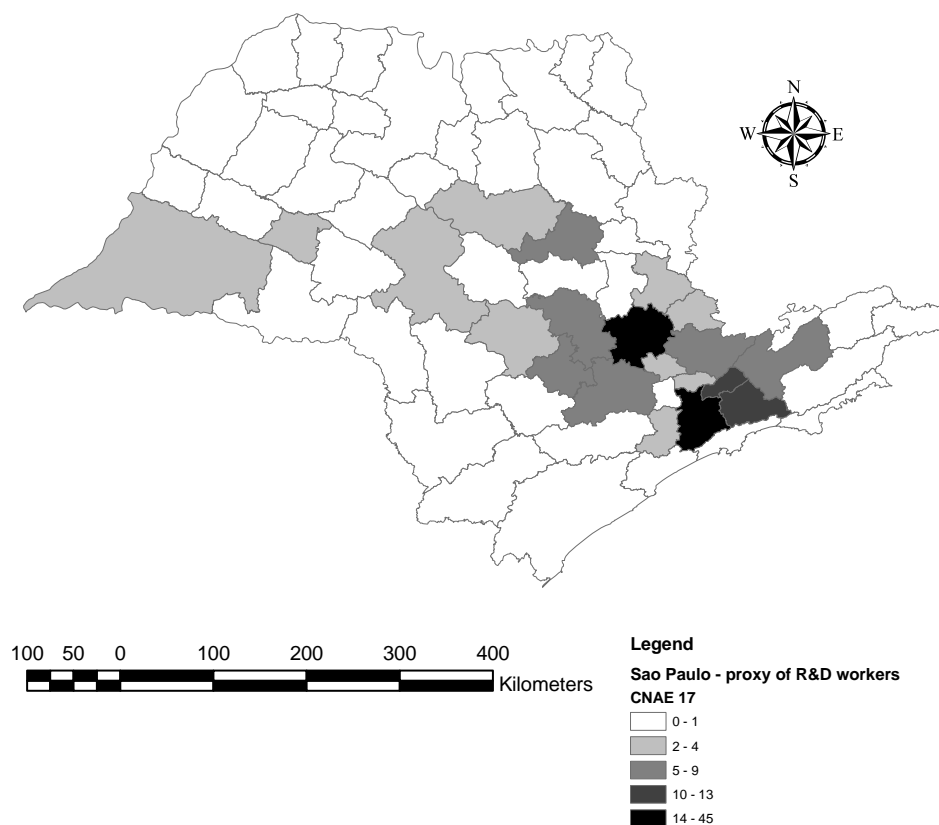
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 15
(Manufacture of food products and beverages)***



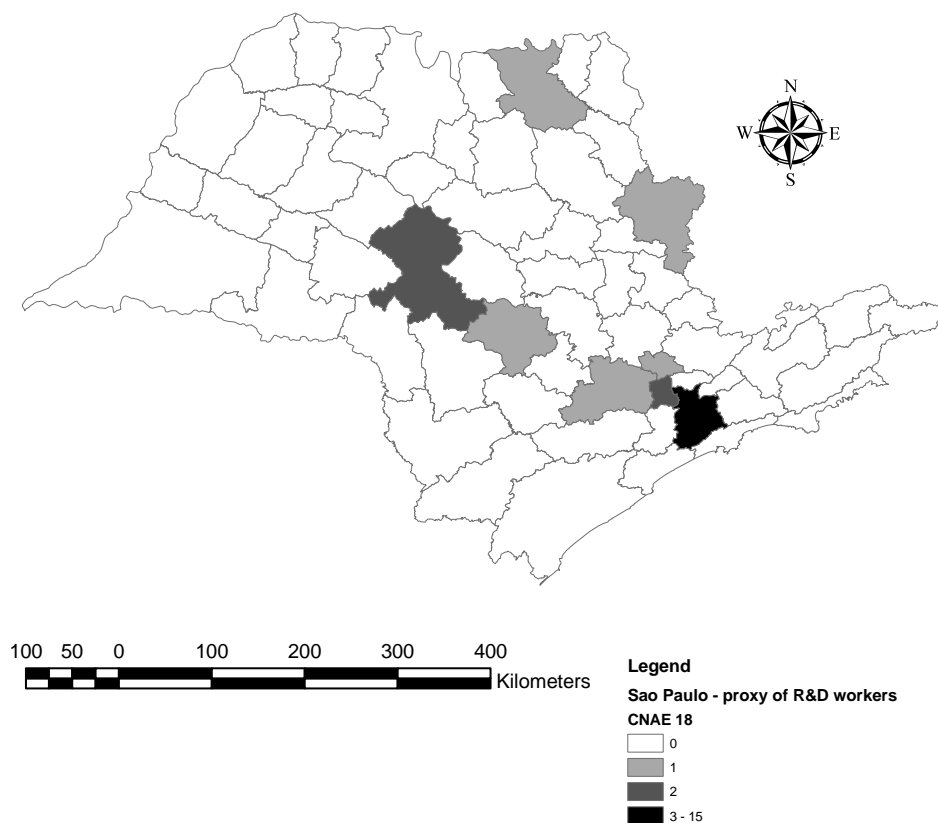
Source: Ministério do Trabalho e Emprego (MTE), *Relação Anual de Informações Sociais (RAIS)*.

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 17
(Manufacture of textiles)**



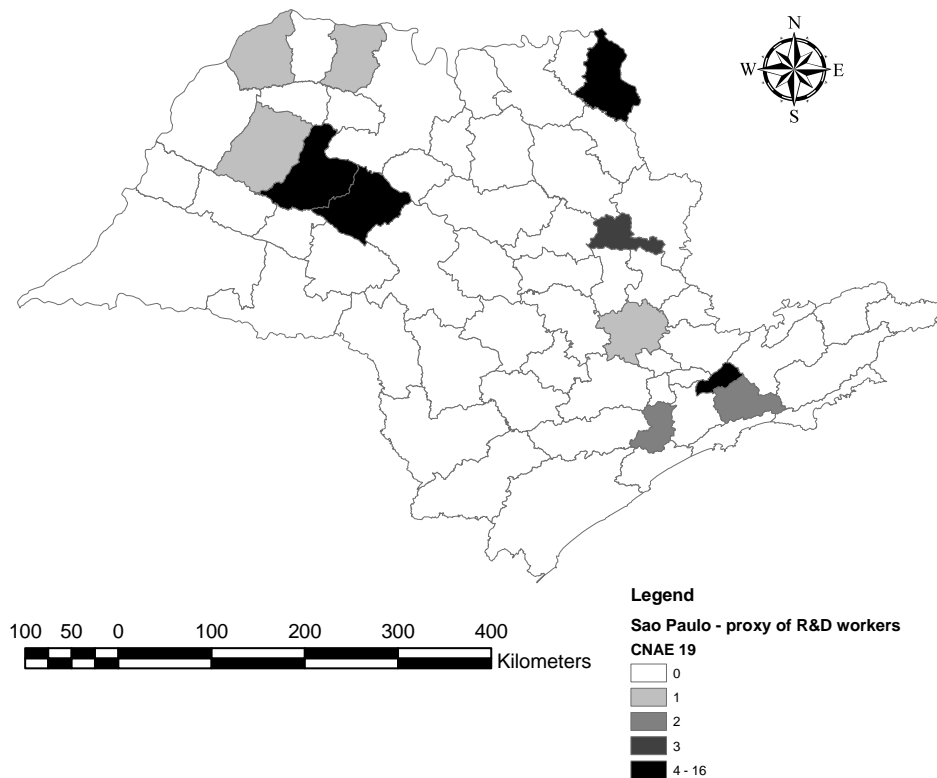
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of
the proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 18
(Manufacture of wearing apparel;
dressing and dyeing of fur)**



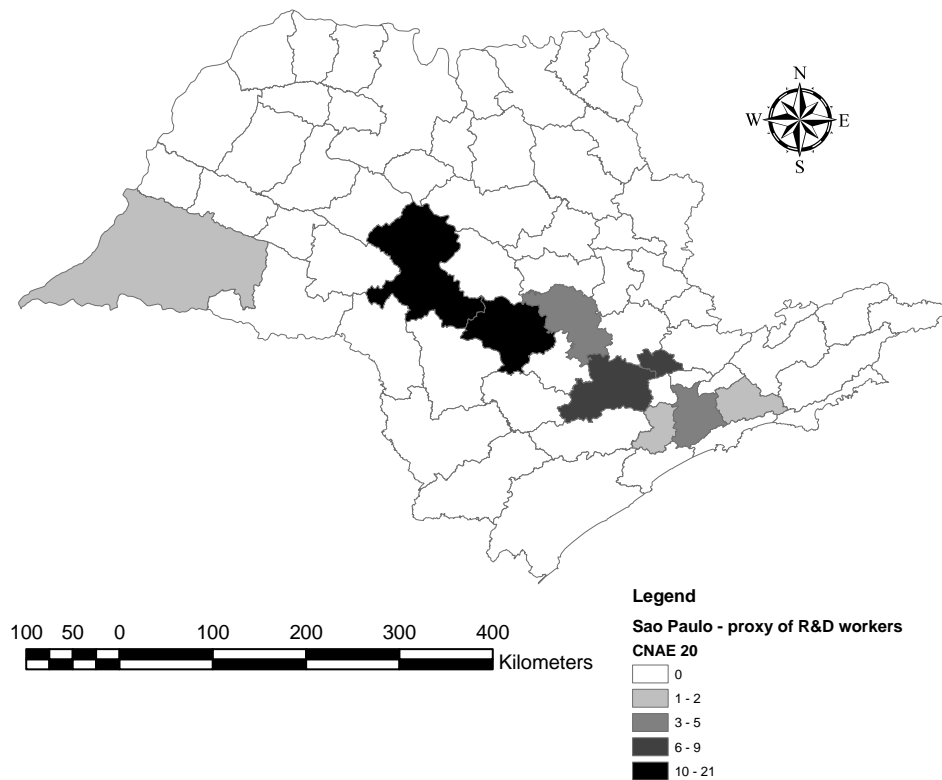
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 19
(Tanning and dressing of leather; manufacture of
luggage, handbags,
saddlery, harness and footwear)**



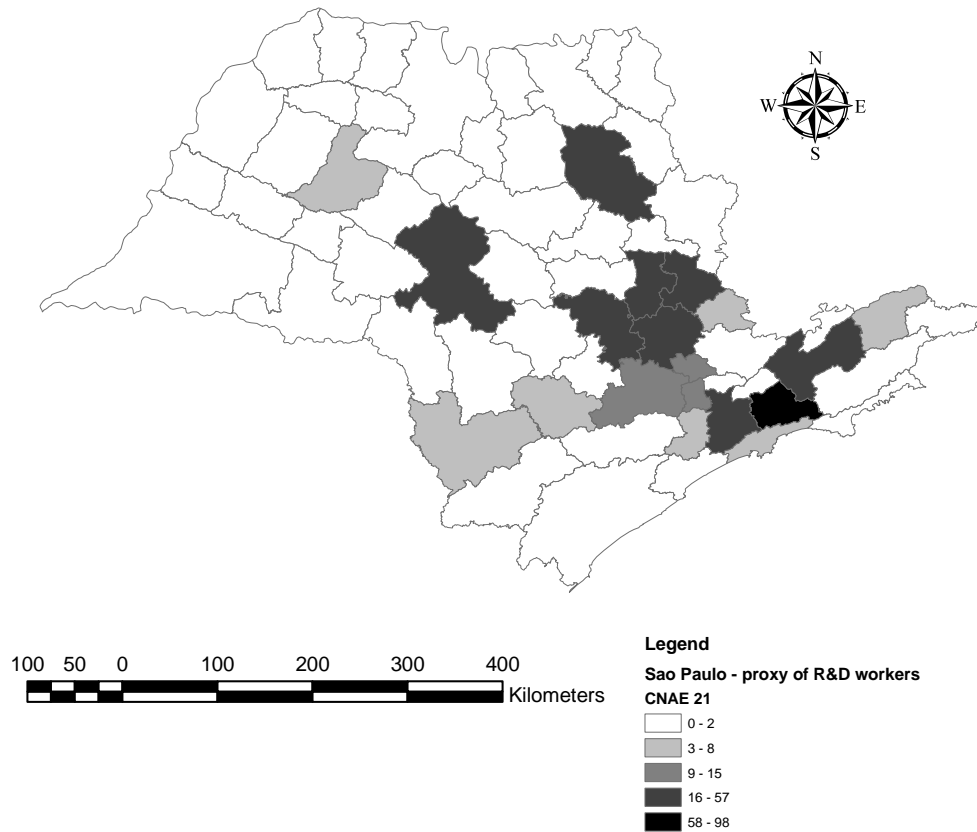
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 20
(Manufacture of wood and of products
of wood and cork, except furniture;
manufacture of articles of straw and plaiting materials)***



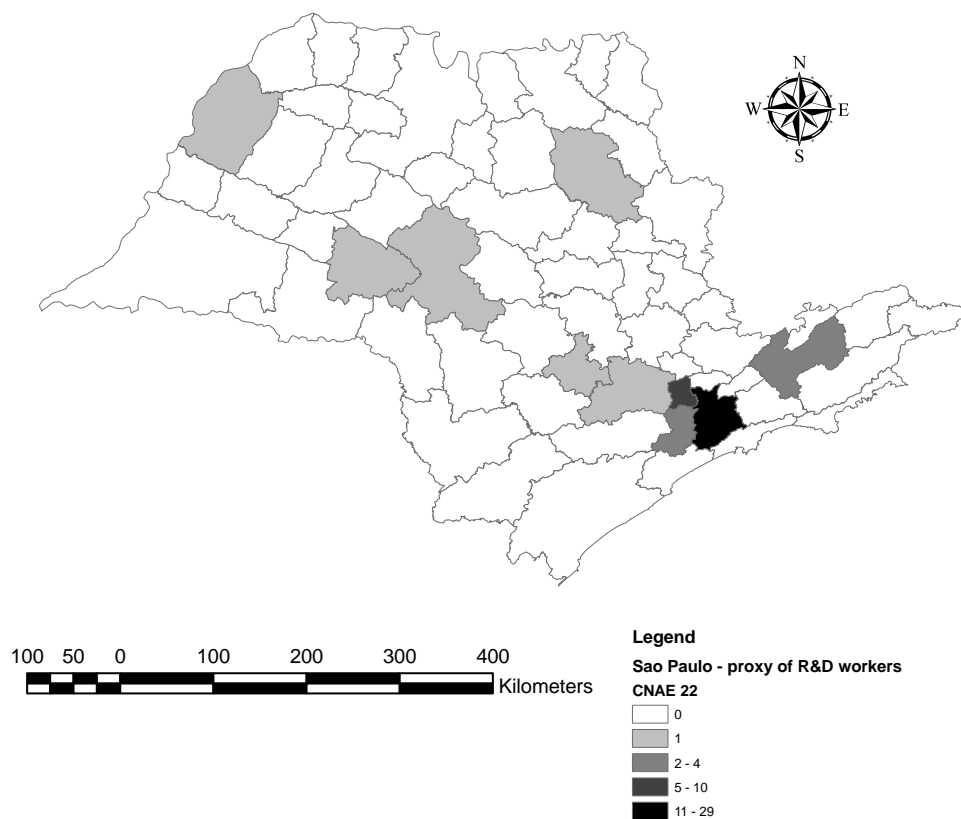
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 21
(Manufacture of paper and paper products)**



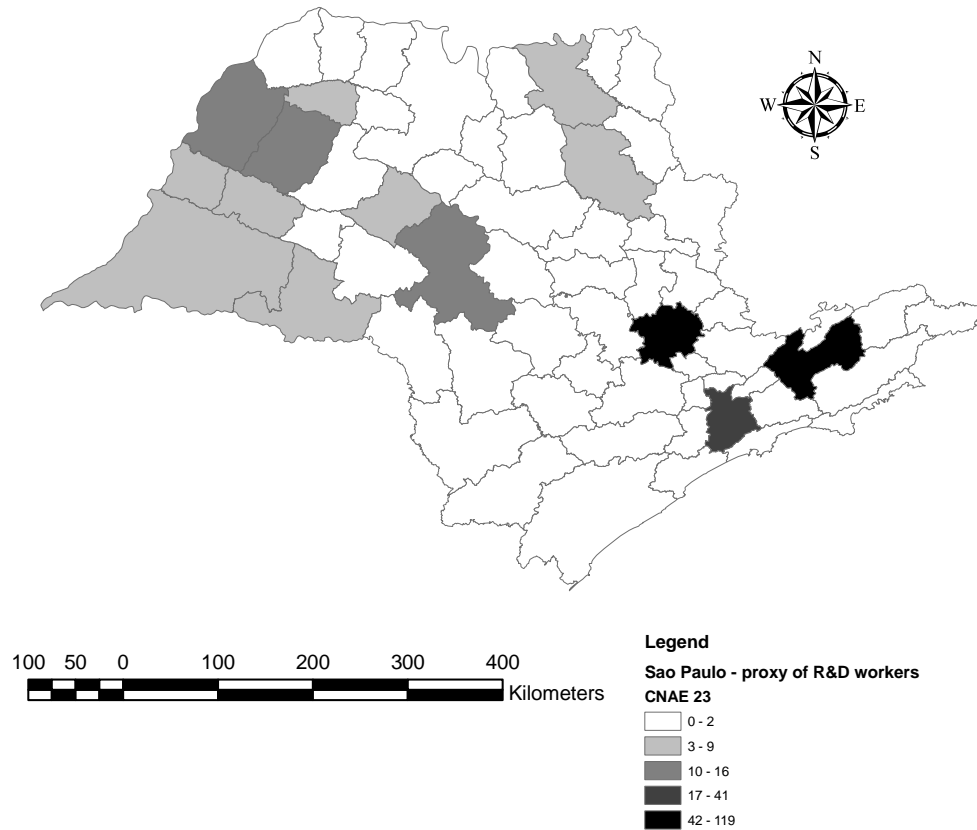
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 22
(Publishing, printing and reproduction of recorded media)**



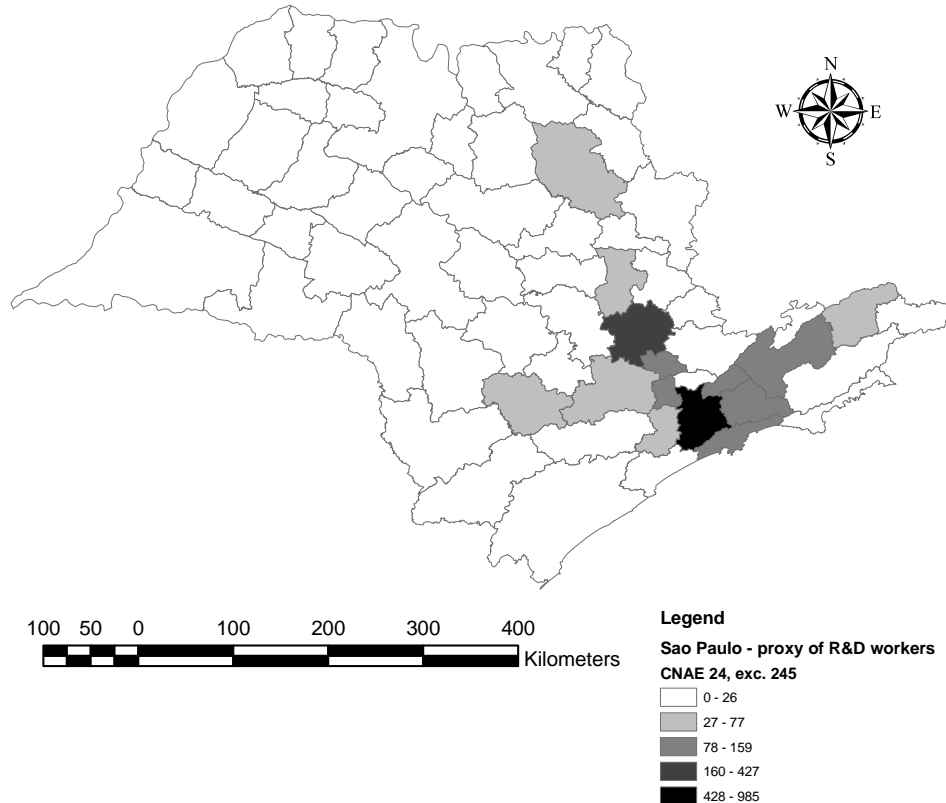
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 23
(Manufacture of coke, refined petroleum
products and nuclear fuel)**



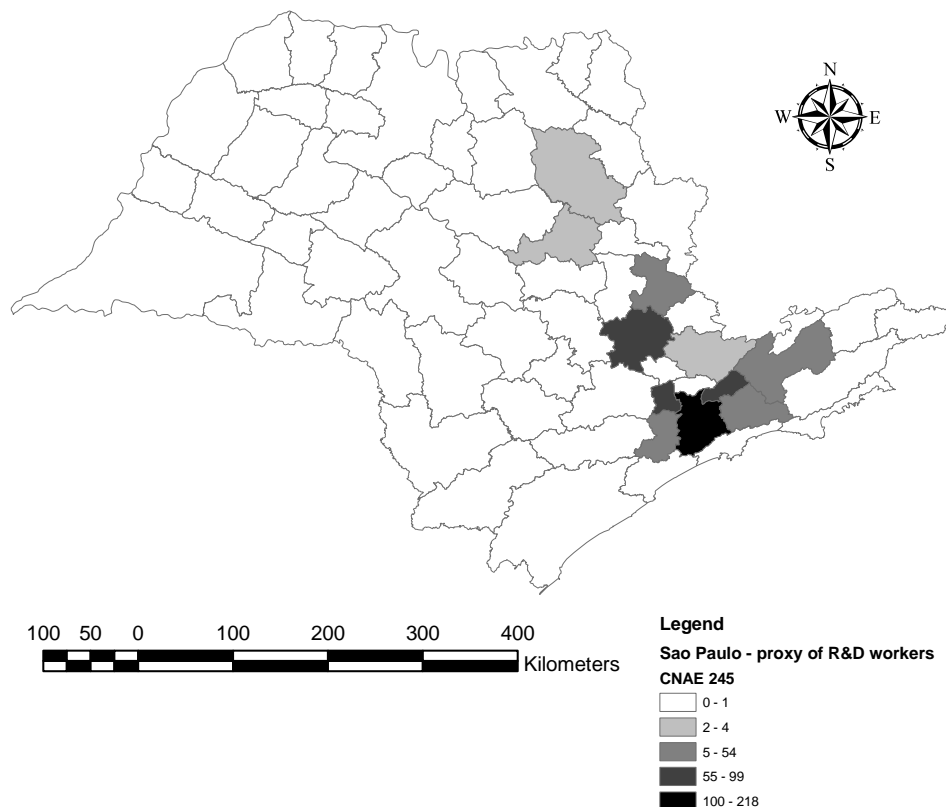
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 24, exc.
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of chemicals and chemical products)**



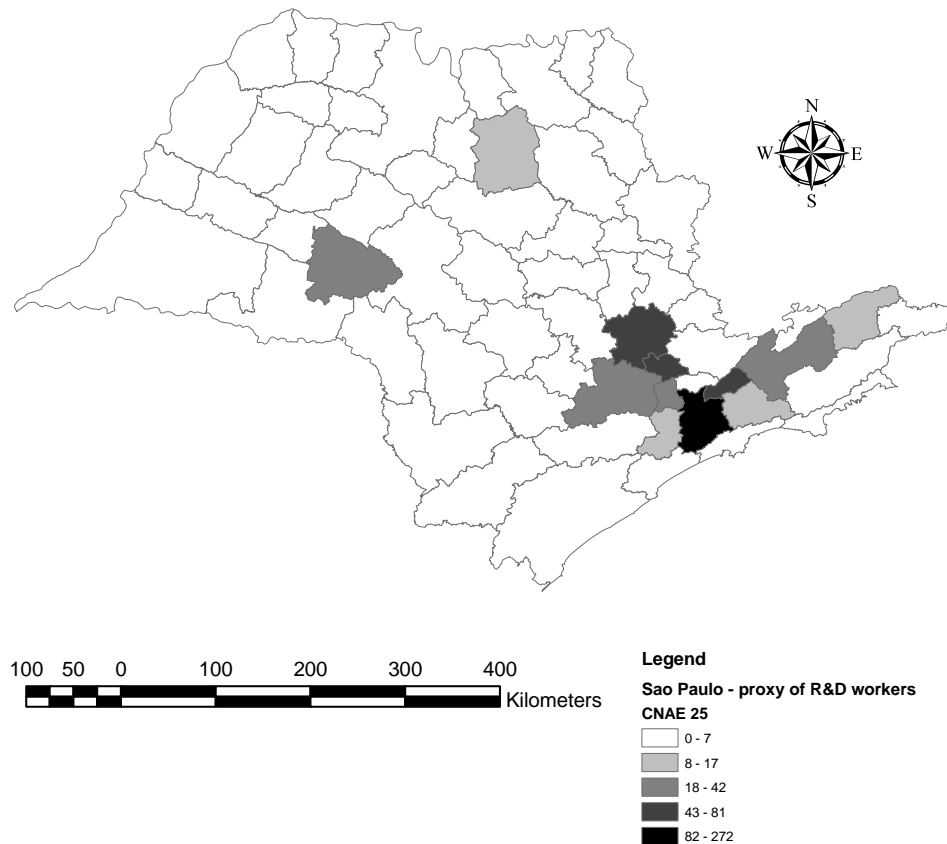
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE 245/ISIC (Rev.3) 2423
(Manufacture of pharmaceuticals,
medicinal chemicals and botanical products)**



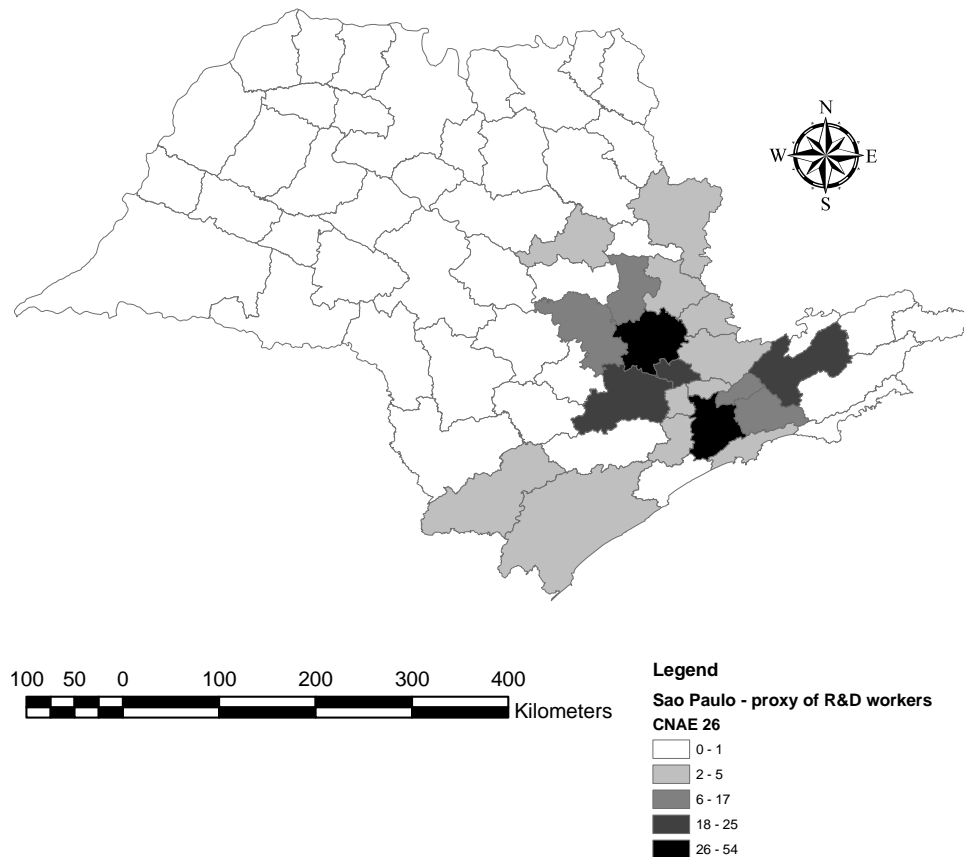
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 25
(Manufacture of rubber and plastics products)**



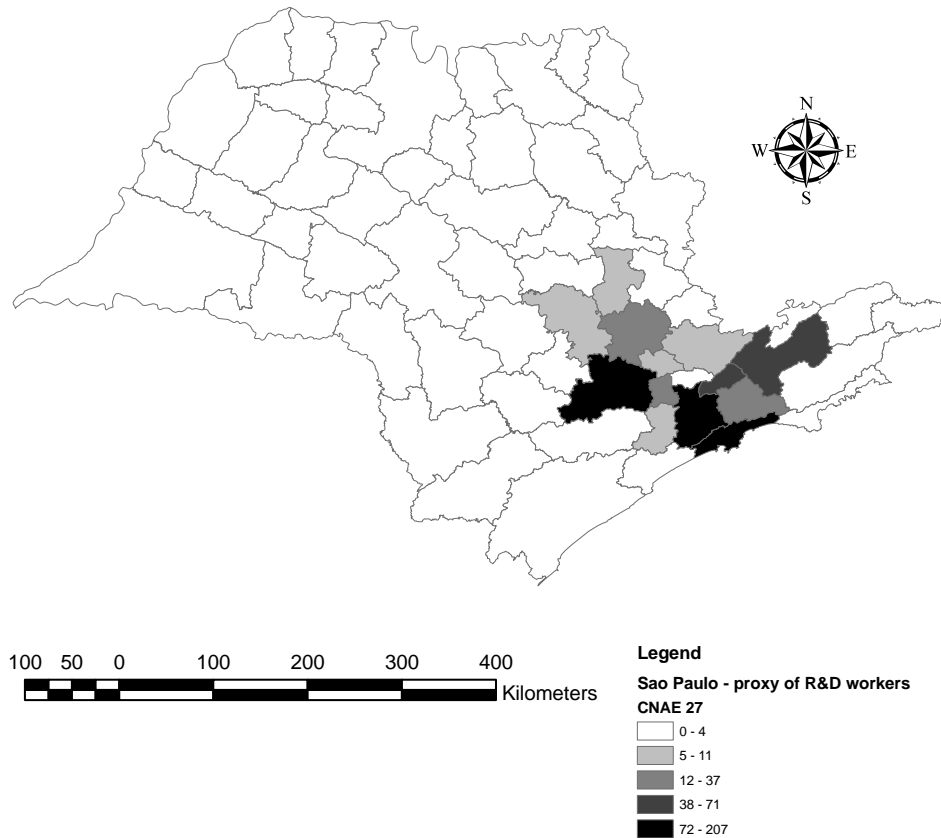
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 26
(Manufacture of other non-metallic mineral products)**



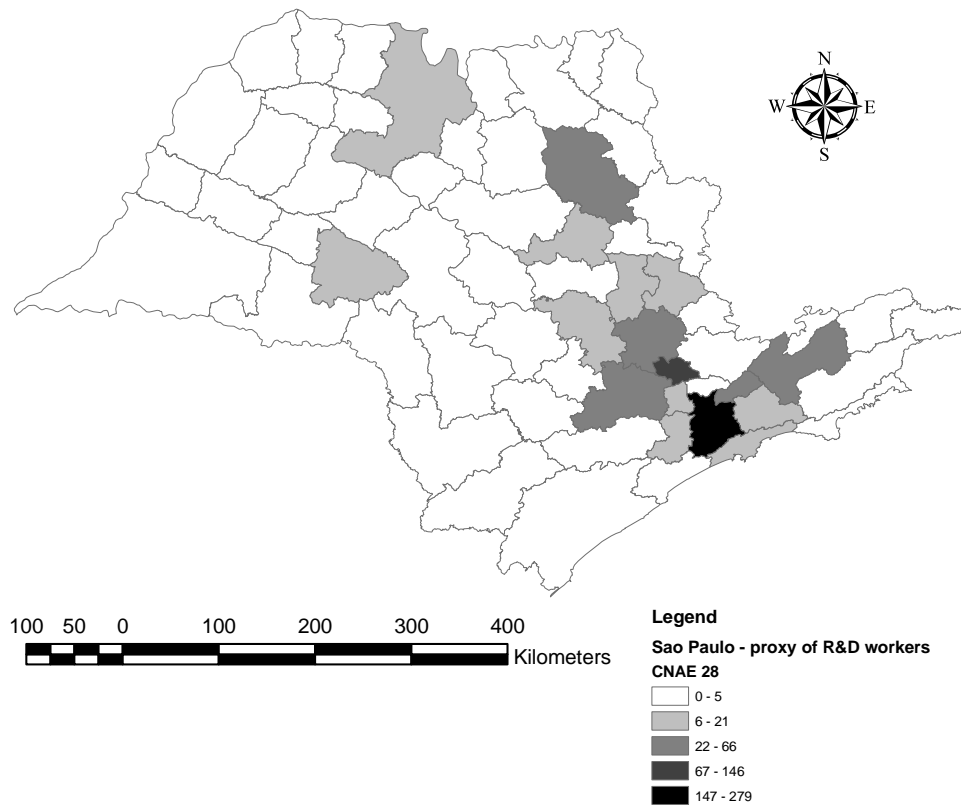
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 27
(Manufacture of basic metals)**



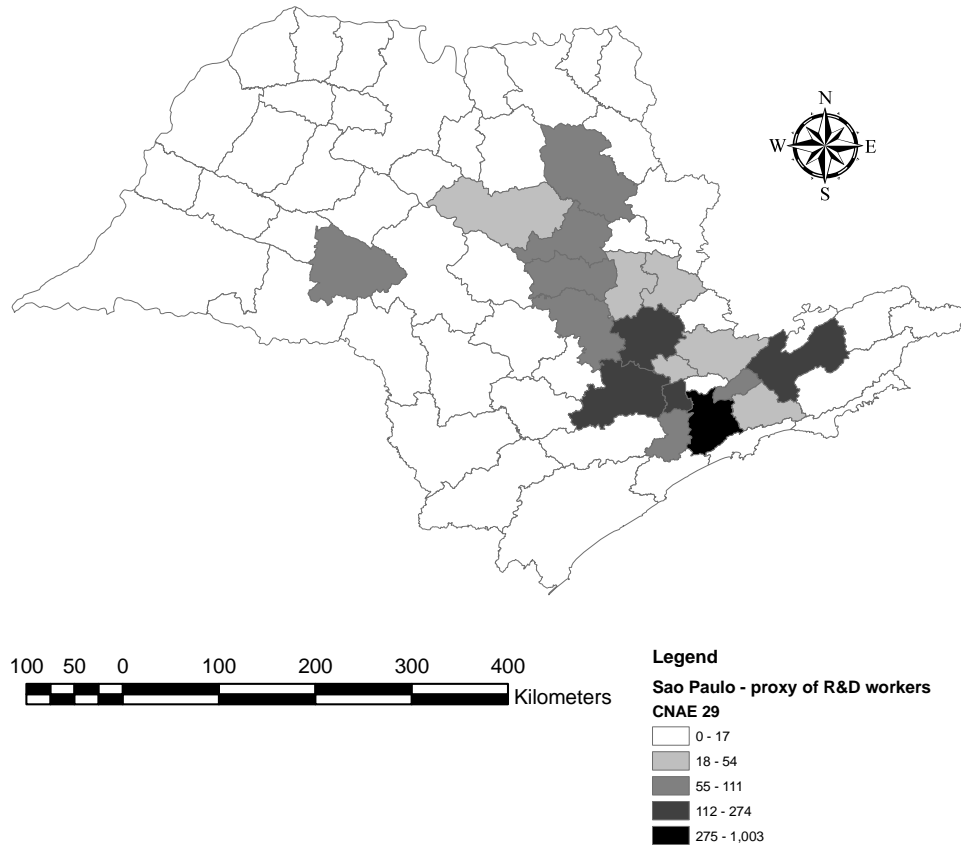
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 28
(Manufacture of fabricated metal products,
except machinery and equipment)**



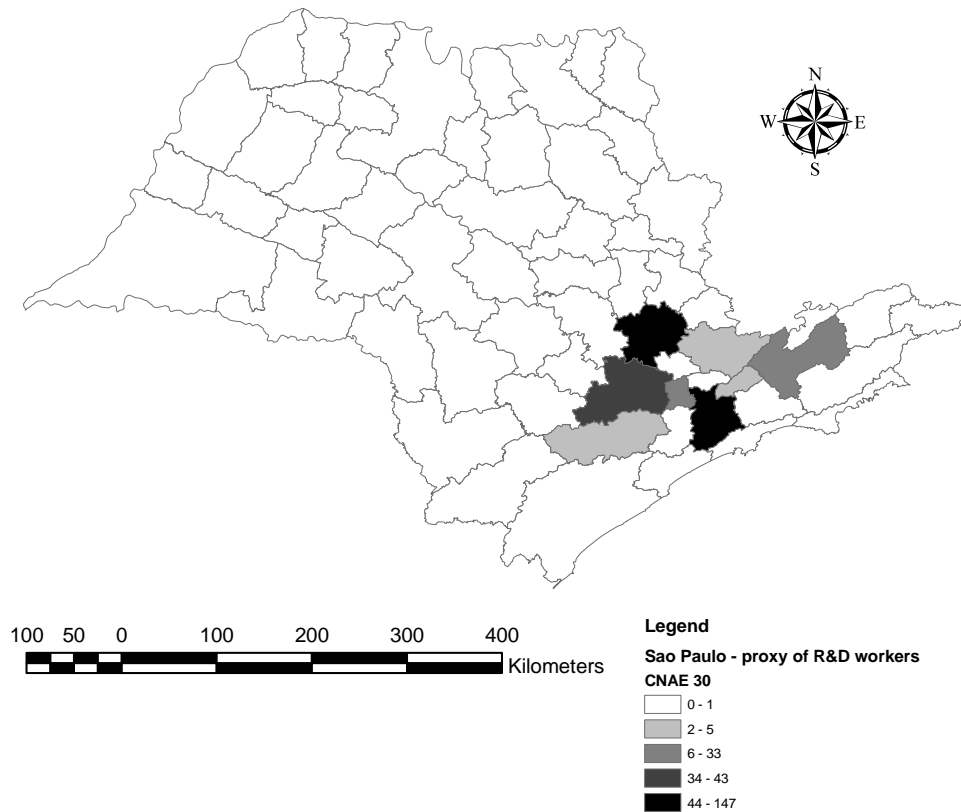
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 29
(Manufacture of machinery and equipment n.e.c.)**



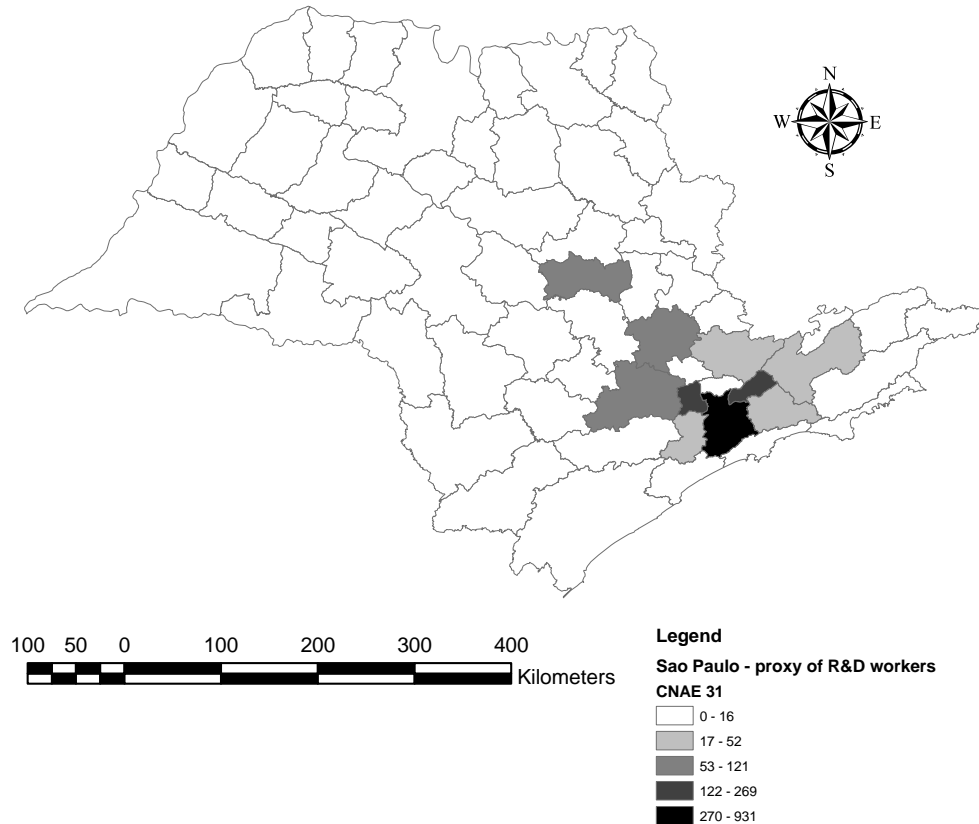
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 30
(Manufacture of office, accounting
and computing machinery)**



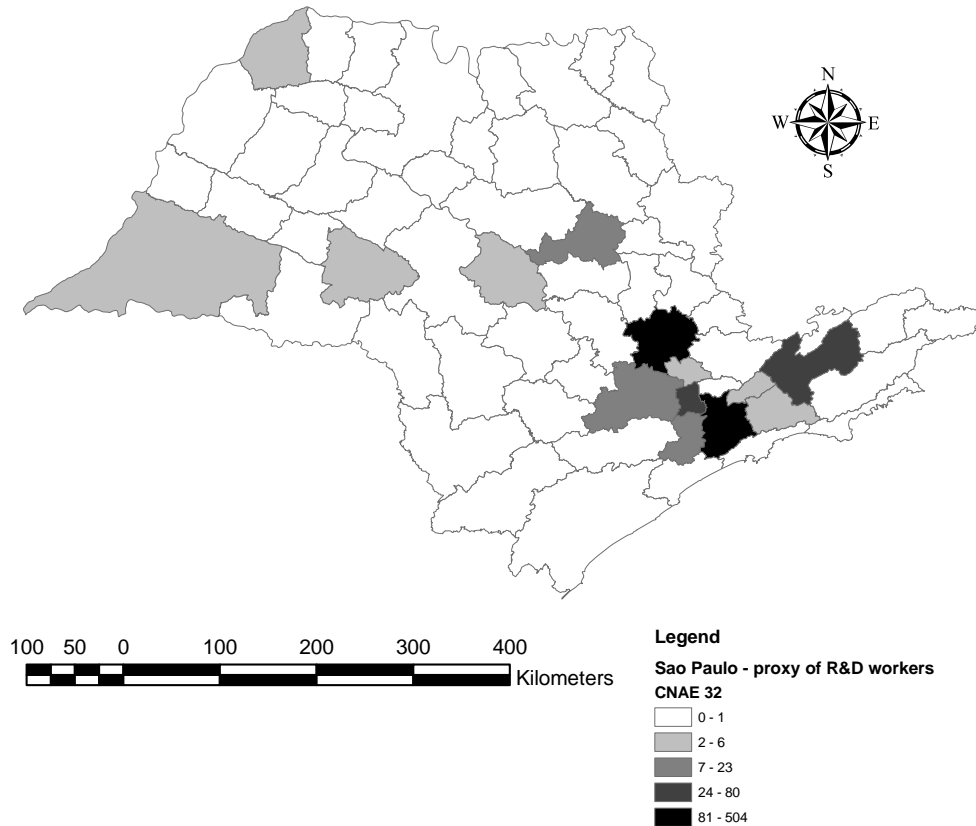
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 31
(Manufacture of electrical machinery and apparatus n.e.c.)**



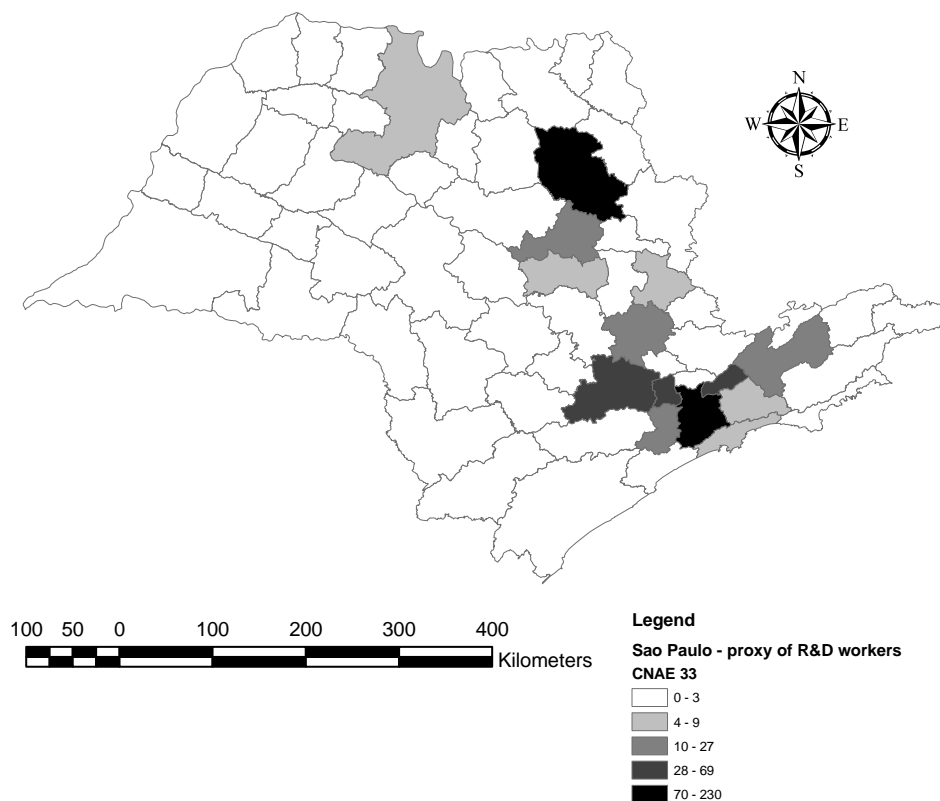
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 32
(Manufacture of radio, television
and communication equipment and apparatus)**



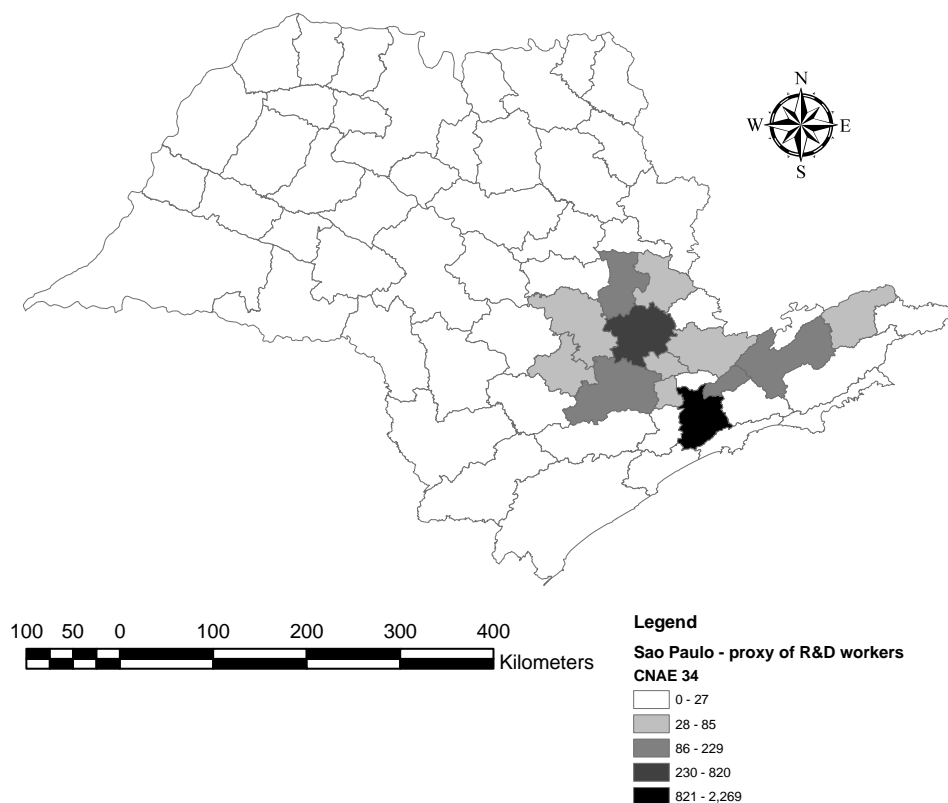
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 33
(Manufacture of medical, precision
and optical instruments, watches and clocks)**



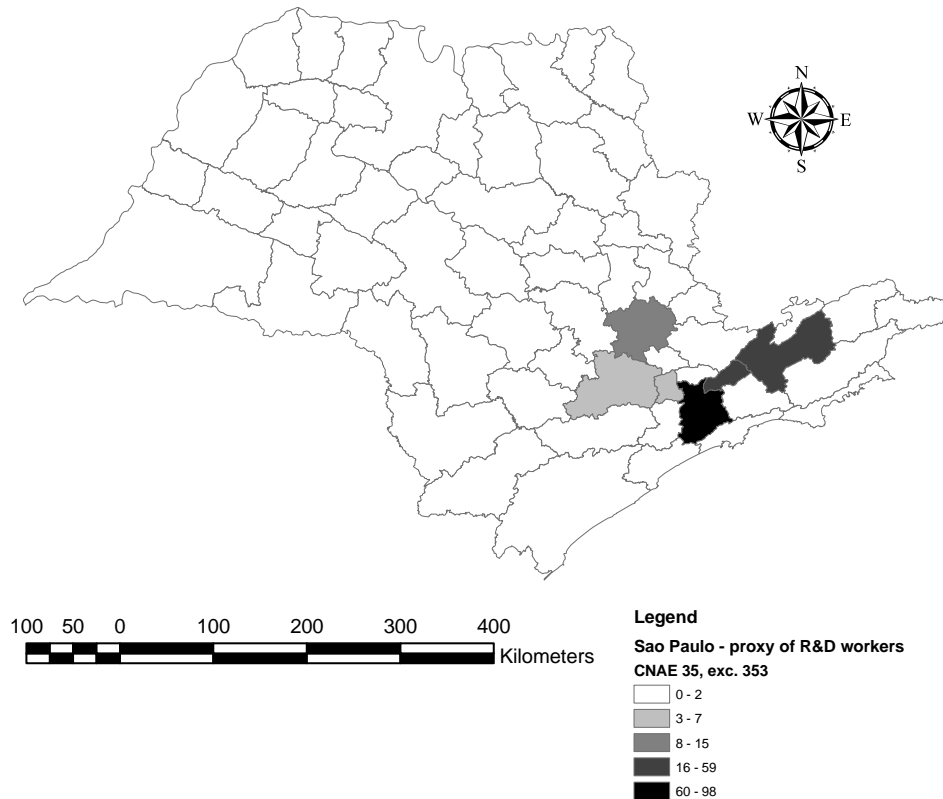
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 34
(Manufacture of motor vehicles, trailers and semi-trailers)**



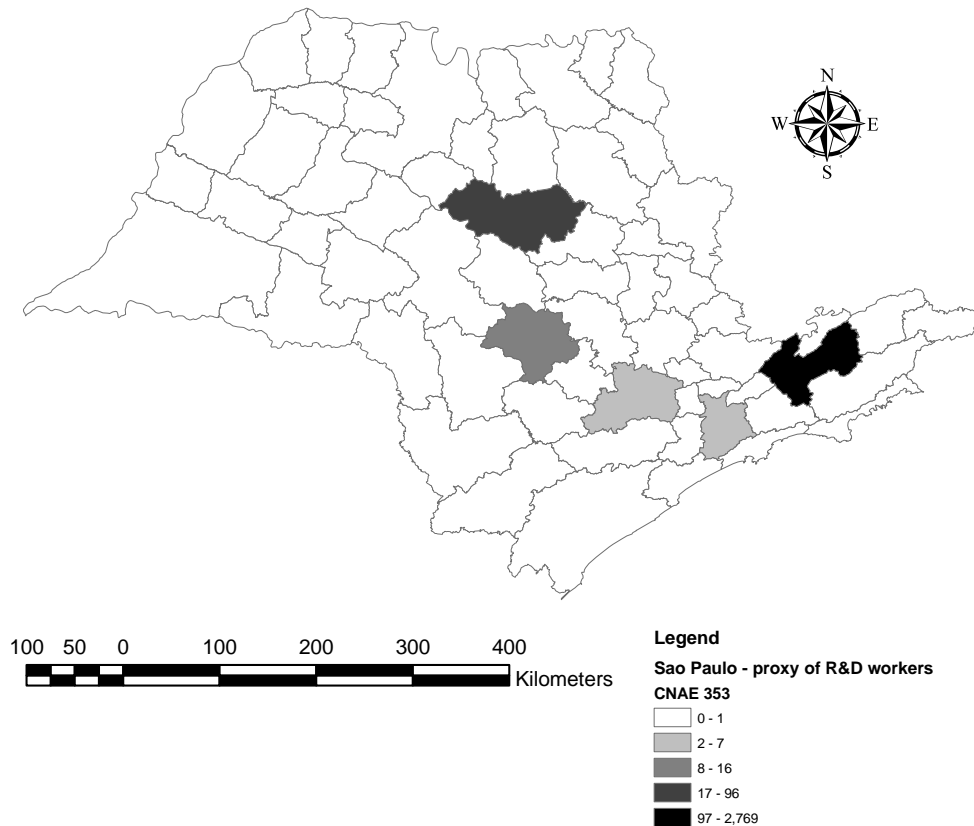
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

***Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 35, exc. CNAE/ISIC (Rev.3) 353
(Manufacture of other transport equipment)***



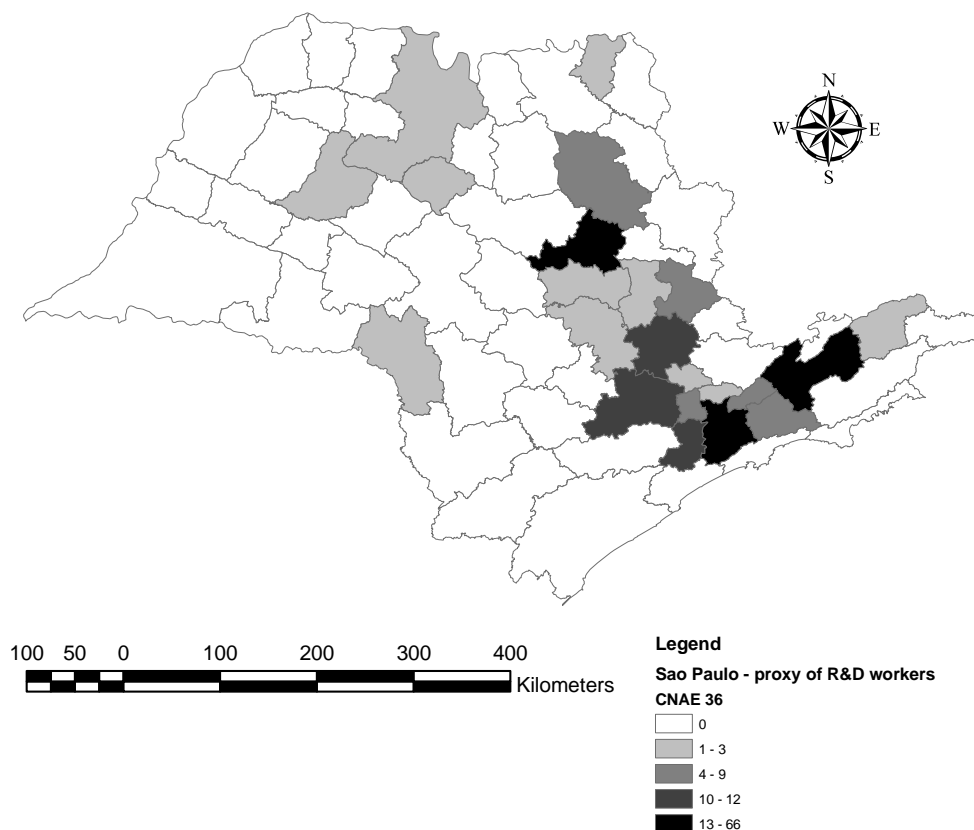
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 353
(Manufacture of aircraft and spacecraft)**



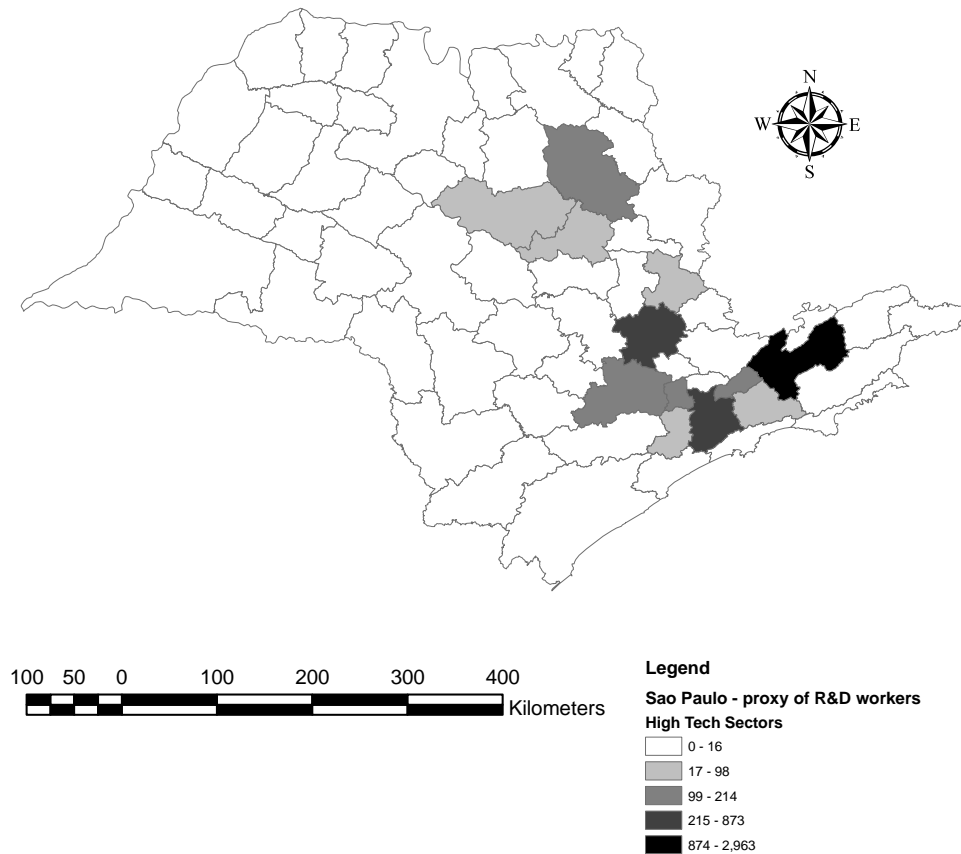
Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
CNAE/ISIC (Rev.3) 36
(Manufacture of furniture; manufacturing n.e.c.)**



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

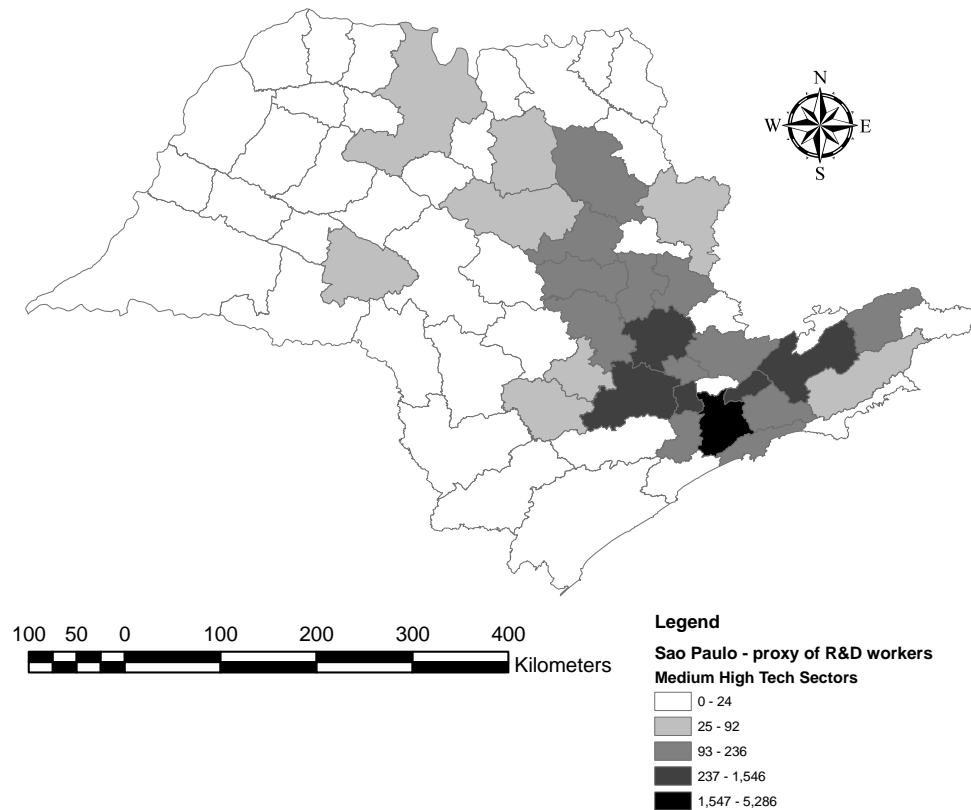
**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
High-Tech Sectors (1)**



(1) High-Tech Sectors: Aircraft and Spacecraft; Pharmaceuticals; Office, accounting and computing machinery Radio, TV and communications equipment; Medical, precision and optical instruments

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

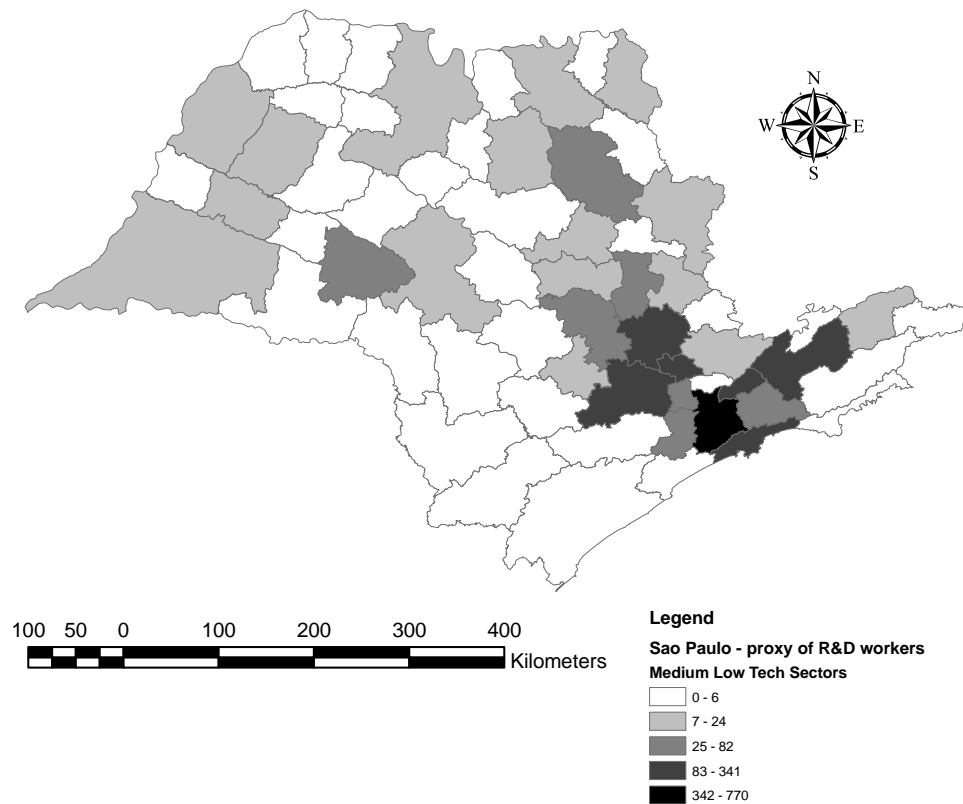
***Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
Medium High-Tech Sectors (1)***



(1) Medium High-Tech Sectors: Electrical machinery and apparatus; Motor vehicles, trailers and semi-trailers; Chemicals (excluding pharmaceuticals); Transport equipment (railroad, boats, ships, motorcycles); Machinery and equipment

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

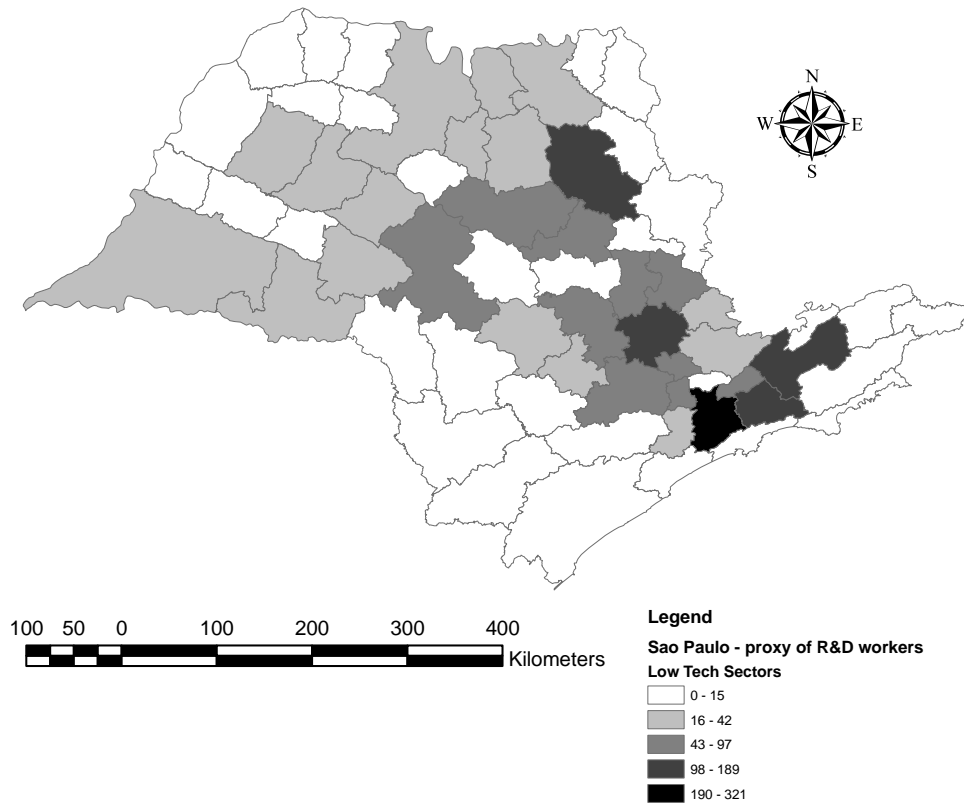
***Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
Medium Low-Tech Sectors (1)***



(1) Medium Low-Tech Sectors: Rubber and plastics products; Coke, refined petroleum products and nuclear fuel; Other non-metallic and mineral products; Basic metals and fabricated metal products

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

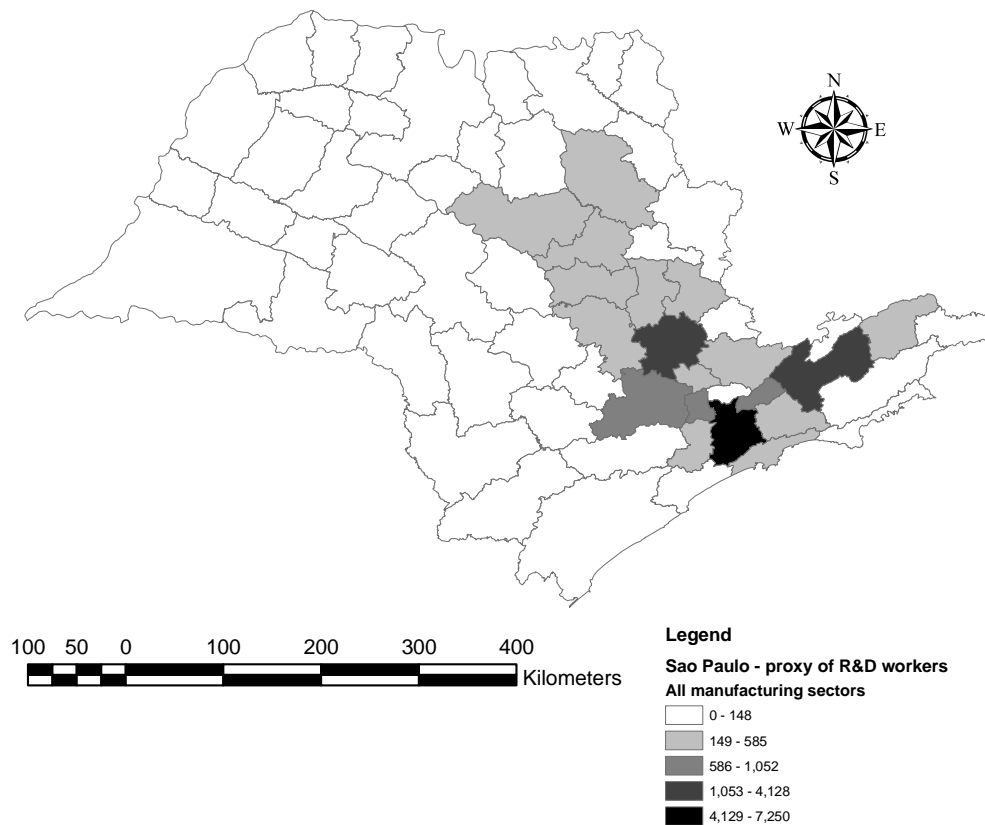
**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
Low-Tech Sectors (1)**



(1) Low-Tech Sectors: Manufacture of furniture and other manufacturing; Wood, pulp, paper, paper products, printing and publishing; Food products and beverages (exc. Tobacco); Textiles, textile products, leather and footwear

Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

**Sao Paulo: regional distribution of the
proxy of Research and Development (R&D)
workers in manufacturing in 2005
All manufacturing sectors**



Source: Ministério do Trabalho e Emprego (MTE), Relação Anual de Informações Sociais (RAIS).

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